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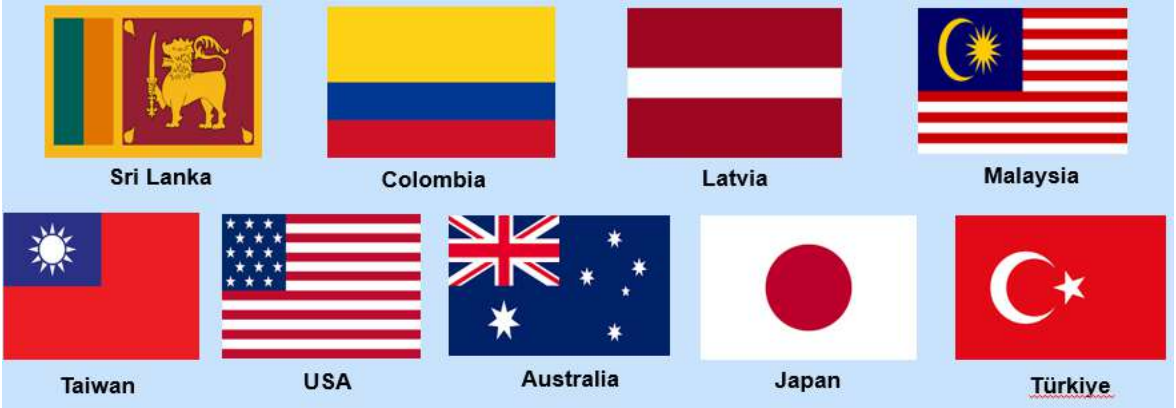

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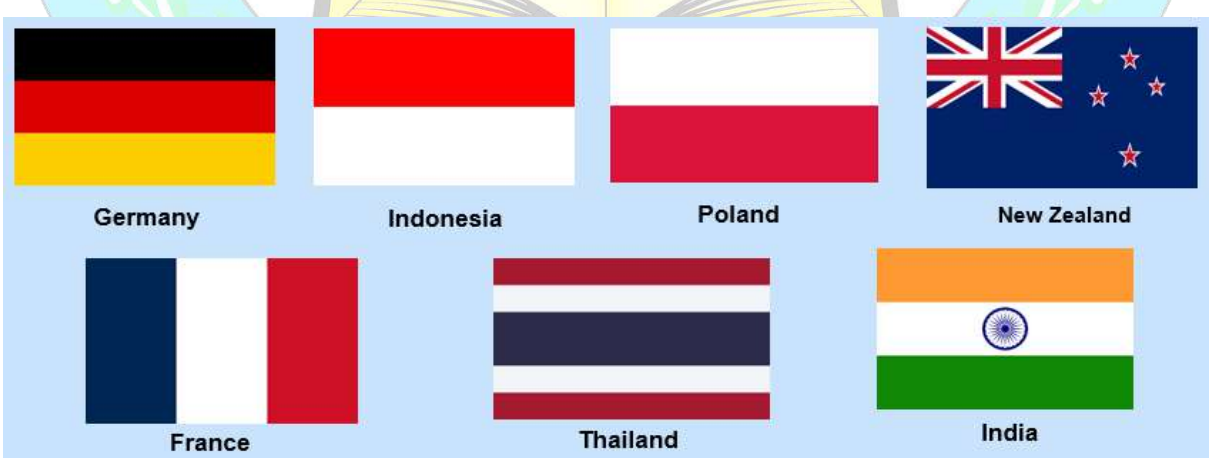

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Preface:

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Editor: Dr. Anupam Krishna

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KEYNOTE SPEAKER

Dr Babasaheb Manik More

Professor in Engineering Physics, Dean, Research and Development Cell, Brahmdevdada Mane, Institute of Technology, Solapur, M.S. India

Topic: Variation in Gravitational Pull: New Technique for Aquifers Mapping

Dr. More has completed his M.Sc. in Applied Electronics (Physics)in 1992 and Ph.D. in "Thin Films and Solar Cells" in 1997 from Shivaji University, Kolhapur, India. He has teaching experience of 29 yrs. at Diploma / Engineering Colleges. His interested areas of research are thin films, optoelectronics, solar cells, ground water, gravitation and bio-geo-physics. In these research areas he has published 26 research papers in national / international journals and presented 24 research papers in national / international conferences. Dr More is Research Guide (Ph.D.) of Solapur University, Solapur in subject of Physics. He is associated with many Journals as Reviewer / Associate Editor / Editor / Executive Editor / Editorial Board Member. He has delivered Invited Talks / plenary speech / Key Note Address at various International Conferences. He worked as Convener of International Conference at BMIT, Solapur, India. He is a member of "World Association for Scientific Research and Technical Innovation (WASRTI), Life member of Indian Society for Technical Education (ISTE) AND Life Member of Institute of Scholar (InSc). Dr More awarded "Research Excellence Award 2020 by Institute of Scholar, Bengaluru, India.

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KEYNOTE SPEAKER

Prof. Dr. Ferda Halicioglu

Ph.D., Senior Lecturer in Economics, Department of Accountancy, Finance and Economics, Lincoln University, United Kingdom

Topic: Success of International Journal Article Publishing in Social Sciences

Prof. Dr. Ferda Halicioglu is a valued member of the research world and has been associated with many renowned turkish universities and colleges. he is also an editor for global business and economics review. his research has been ranked amongst the u.k. by repec, which indicates that he is in the top 10% according to overall research performance. as of june 2014, the turkish monthly magazine platin identified him as one of the most influential 25 turkish economists in the world. the total citations for his research are more than 4500, and significant numbers of these citations are in international journals with high impact factors. he has been awarded numerous awards and scholarships throughout his career.

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KEYNOTE SPEAKER

Dr. Michel Gagne

Oxford Association of Management in the Grade of Certified Doctor of Business Administration, Kuala Lumpur, Malaysia

Topic: New Trends in Multi-Sensory Imagery Training (Its impact on the rehabilitation process)

Mr. Gagné is a high-performance lifestyle coach and consultant, a mental preparation coach with Canadian Olympic Medallists athletes, a management trainer in international corporate circles, a speaker and facilitator for more than 50 years. He has worked in Canada, Europe, Middle East, Asia, Africa and the Caribbean.

Excellent motivator, Michel has worked with several Olympic Medallists and Athletes from Canada and abroad since the 1972 Munich Olympic Games. He has been an advisor, trainer and coach of several Olympic Coaches from Canada, Caribbean Islands, Sri Lanka, India, Malaysia, Singapore, Brunei. He was involved in the Montreal 1976 Olympic Games as Manager of the Training Venues.

He started getting involved in mental preparation for Olympic Athletes in several sports in Canada and abroad from 1972 until now.

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KEYNOTE SPEAKER

Prof. Nancy S. Steinhardt

Professor of East Asian Art and Curator of Chinese Art at the University of Pennsylvania, Pennsylvania

Topic: The Borders of Chinese Architecture

Nancy S. Steinhardt is Professor of East Asian Art and Curator of Chinese Art at the University of Pennsylvania where she has taught since 1982. She received her PhD at Harvard in 1981 and was a Junior Fellow at Harvard from 1978-81. Steinhardt taught at Bryn Mawr from 1981-1982. She has broad research interests in the art and architecture of China and China's border regions, particularly problems that result from the interaction between Chinese art and that of peoples to the North, Northeast, and Northwest. Steinhardt is author or co-editor of Chinese Traditional Architecture (1984), Chinese Imperial City Planning (1990), Liao Architecture (1997), Chinese Architecture (2003), Reader in Traditional Chinese Culture (2005), Chinese Architecture and the Beaux-Arts (2011), Chinese Architecture in an Age of Turmoil, 200-600 (2014), The Chinese Mosque (2015), Chinese Architecture: Twelve Lectures (2017), China: an Architectural History (2019), The Borders of Chinese Architecture (2022), and "Yuan: Chinese Architecture, Mongol Patrons" (under contract) and more than 100 articles. She is a recipient of grants from the Guggenheim Foundation, Institute for Advanced Study, National Endowment for the Humanities, American Council of Learned Societies, Getty Foundation, Chiang Ching-Kuo Foundation, Social Science Research Council, American Philosophical Society, Graham Foundation for Advanced Study in the Fine Arts, Van Berchem Foundation, and Metropolitan Center for Far Eastern Art. She has given more than 400 public lectures or conference talks. Steinhardt is involved in international collaborations in China, Korea, Japan, Mongolia, and Russia. She has been an advisor, guest curator, or author for exhibitions at China Institute, Asia Society, the Metropolitan Museum, Japan Society, Chicago Art Institute, Smart Museum, and the Penn Museum. She is on the Board of the Society of Architectural Historians. Steinhardt won both the Distinguished Teaching of Art History Award from the College Art Association and the Provost's Award for Distinguished Ph. D Teaching and Mentoring from Penn in 2019. In 2021 she was the Alice David Hitchcock Book Award from the Society of Architectural Historians for Chinese Architecture: A History.

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KEYNOTE SPEAKER

Prof. Dr. Sergei Gorlatch

University of Muenster, Germany

Topic: Distributed Software Applications Based on Mobile Cloud and Software-Defined Networks

Sergei Gorlatch is a Full Professor of Computer Science at the University of Muenster (Germany) since 2003. Earlier he was an Associate Professor at the Technical University of Berlin, Assistant Professor at the University of Passau, and Humboldt Research Fellow at the Technical University of Munich, all in Germany. Prof. Gorlatch has more than 200 peer-reviewed publications in renowned international books, journals and conferences. He was the principal investigator in several international research and development projects in the field of software for parallel, distributed, Grid and Cloud systems and networking, funded by the European Community and by German national bodies.

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KEYNOTE SPEAKER

Ana Sofia Saldanha

Translator, University Lecturer in Translation in Universidade Autónoma de Lisboa, Mentor and Member of the International Mentoring Association, and Researcher in Translation Didactics and Mentoring, Ph.D. student in Translation in University of Vigo, Spain

Topic: Mentoring as a Science to Develop a Prolific Career

Ana Sofia Saldanha, Professional Translator, University Lecturer and Mentor. Associate Board Member of the International Mentoring Association in USA and member of the TERA Research Group. Interested in Mentoring, Soft Skills, Training and Continuous Professional Development for Translators. Also interested in applying Mentoring in other areas of studies/professional development.

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KEYNOTE SPEAKER

Dr. Liudmyla Gryzun

PhD & Post-Doctoral Degree in Pedagogical Science, Full Professor of Simon Kuznets Kharkiv National University of Economics, Kharkiv, Ukraine

Topic: Interactive Methods for Blended Learning Implementation: Experience of Potential IT-Specialists' Training

Dr. Liudmyla Gryzun is a Full Professor of the Information Systems Department at the National University of Economics preparing IT specialists for various branches of the economy. Liudmyla earned an M.A. in Applied Mathematics from the State University of Kharkiv (Ukraine); PhD and Post-Doctoral Degree in Pedagogical science from the National Pedagogical University of Kharkiv (Ukraine). Her sphere of research is focused on the synchronized curriculum and holistic educational content design in higher education; Artificial Intelligence application to pedagogical problems solution; Petri networks apparatus as a tool for modeling in education; IT tools for inquiry-based and holistic learning etc. Dr. L. Gryzun's recent successful contributions include (1) participation in a regional research group "Artificial Intelligence and its Application to Pedagogical Diagnostics Systems" (2013-2015); (2) work as an international expert of the Open European-Asian Research Analytics Championship under the Program of the International Academy of Sciences and Higher Education (London, UK) (2012-2017); (3) participation in the European educational fair for STEM teachers "Science on the stage" (2019); (4) work as a member (since September 2021 as a President) of the International organization Scientific and Technical Research Association (STRA), presenting the results of her research as a Keynote Speaker at the number of Eurasia Research International conferences (2018 – 2022).

Prof. L. Gryzun is a member of the editorial team of the journal Educational Technology Quarterly (Ukraine) (https://acnsci.org/journal/index.php/etq/about/editorialTeam), and a reviewer of the "Universal Journal of Educational Research" (USA).

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KEYNOTE SPEAKER

Marizen B. Contreras

Associate Professor, College of Engineering, University of Batangas, Hilltop Site, Batangas City, Philippines

Topic: Lean Systems for Educational Institutions

Engr. Marizen B. Contreras is a Registered Professional Industrial Engineer of the Mechanical Engineering Department of the College of Engineering of the University of Batangas, Batangas City, Philippines. She is a full-time Associate Professor at the College of Engineering and the Graduate School of the University of Batangas, where she finished her graduate studies in Business Administration and undergraduate studies in Industrial Engineering. She has also finished her academic requirements in Doctor of Business Administration at Pamantasan ng Lungsod ng Maynila, Philippines, where she obtained her MS degree in Management Engineering. Prior to her present designation, she was assigned as the chairperson of Industrial Engineering at the University of Batangas for 8 years. She is an ISO Auditor, ALCUCOA Accreditor, researcher, adviser, and statistician. Different professional organizations, local and international, recognized her scholarly works and vested her with the following awards: Best Presenter at the International Conference on Innovative Research in Engineering and Technology (ICIRET 2021), Outstanding Paper Award recipient at World Conference in Business and Management 2018, Best Presenter Award at 2019 – IInd International Conference on Business, Economics, Law, Language, & Psychology (ICBELLP), Best Paper Award at 5th Hernando B. Perez Search for the Best Faculty Research Paper, Best Quantitative Paper Award at the 13th Network of CALABARZON Educational Institutions, Inc. (NOCEI) Research Forum and • Selected Paper Award recipient at the World Conference in Business and Management 2019. She served as Session Chair at WCBM 2018 (Jeju National University) and 2019 (University of Kuala Lumpur). She also served as Keynote Speaker at the International Conference for Science and Technology Research (ICSTR 2019) at Ramada Grandview Hotel, North Point, Hong Kong, and at the International Conference for Science and Technology Research (ICSTR 2020) at Nine Tree Premier Hotel, Myeongdong 2, Seoul, South Korea. She has published her research paper in the Global Business and Finance Review 2018, a Scopus (Elsevier) indexed journal.

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PRESENTERS

(Applicants & Participants)

Muhammed Ikbal Tortumluoglu
ERCICSTR2207062

Experimental Investigation of Local Scour Around Trunk Section of Rubble Mound Breakwater in Case of Broken and Unbroken Waves

Muhammed Ikbal Tortumluoglu
The Graduate School of Natural and Applied Sciences, Dokuz Eylul University, Izmir, Turkey

Abstract

Stability losses caused by the scour can lead to significant repairing cost increases in coastal structures. Sumer and Fredsøe (2002) describe the situation caused by the scour in the coastal structures as " Scour is a threat to the stability of coastal structures " (p. 6). These structures may be pipelines, bridges, breakwaters, group piles, offshore platforms, etc. The risk of the scour causing stability losses around coastal structures makes the scour a phenomenon worth examining. Since the scour can destroy the other coastal structures such as breakwaters, it makes the scour an important phenomenon. The scour in the literature is examined in two different parts of the breakwater as trunk and head sections. Most of the studies were conducted on the trunk section. In this sense, this paper aims to investigate the scour process in the trunk section of the rubble-mound breakwater for broken and unbroken wave cases experimentally. Time-dependent scour depth and wave measurements were obtained with the help of ultrasonic devices. These devices work on the principle of high-frequency sound waves. The experiments were carried out by changing three different median grain diameter sand materials (0.23 mm, 0.55 mm, 1.85 mm), two different breakwater surface slopes (1:1.5 and 1:1.75), and five different regular waves (1.7 s, 2.0 s, 2.3 s, 2.7 s, 3.1 s). As a result of the experiments, there is a notable decrease in local scour when the waves are broken.

Keywords: Rubble Mound Breakwater, Trunk Section, Broken Waves, Unbroken Waves, Local Scour, and Experimental Study.

INTRODUCTION

Breakwater structures built to create a calm water level can be damaged as a result of the scour effect, resulting in high repairing costs. In the trunk and head sections of these structures, scour and deposition occur with the effect of waves and currents. As a result of the scour, stability problems and damages can be occurred. For this reason, it is crucial to examine the scour that occurs around the breakwaters. In the scope of this paper, the local scour in the trunk section is examined for the broken and unbroken wave conditions.

Breakwaters can be divided into many classes according to their shapes, the materials they are made of, their purpose of use, and their appearance in the plan. Foremost among them, the rubble mound breakwater is the most built in our country and the world. One of the important factors that make these breakwaters to be preferred is that the stone material to be used in the construction of the rubble mound breakwater is close to the construction site which means lower construction costs. Examining the stability losses that may occur due to local scours in these structures, which were built to create a calm water level, is of great importance in reducing the repair costs.

In the present study, the experiments were carried out by changing three different median grain diameter sand materials (d_{50} = 0.23 mm, d_{50} = 0.55 mm, d_{50} = 1.85 mm), two different breakwater surface slopes (1:1.5 and 1:1.75), and five different wave periods (1.7 s, 2.0 s, 2.3 s, 2.7 s, 3.1 s). Those experiments showed that the scour reduced significantly in the case of the wave broken case compared to the unbroken case. All experiments were carried out in regular wave effect. Additionally, the scour occurs in two different stages as scour development and equilibrium stage as a result of the experiments.

EXPERIMENTAL SET-UP AND METHODOLOGY

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The experimental study was carried out in an existing open-wave channel with a length of 33 m, a width of 3.6 m, and a depth of 1.2 m. The experimental studies were carried out in the channel of Dokuz Eylul University, Hydraulics Laboratory. In the open sea part of the open channel, a plunger-type wave generator was used to form regular waves with different heights and periods. A schematic view of the channel in which the experiments were carried out, is shown in Figure 1. It can be seen that regular waves created by the wave generator are broken on the ramp and then affect the breakwater. The unbroken wave experiments were carried out before the ramp was placed in the same channel.

Before each experiment, some seabed materials with the thickness of d_{50} = 0.23 mm, d_{50} = 0.55 and d_{50} = 1.85 mm were located in the surroundings of the breakwater without any compaction process. After each experiment, the surface of the disturbed bed was arranged to create a horizontal surface. The seabed materials used in the experimental studies are quartz sand and have a uniform distribution. The median grain diameters of the sands used in the experiments are as follows: d_{50} = 1.85 mm, d_{50} = 0.55 mm, and d_{50} = 0.23 mm for large, medium and small grain sizes, respectively.

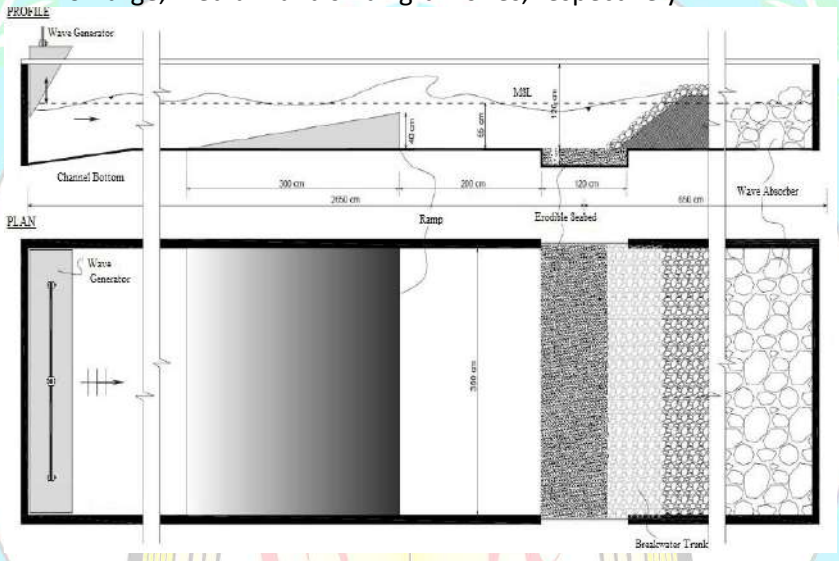

Figure 1. *Profile and plan view of the trunk section of the breakwater.*

Two different measuring devices, UVP and ULS, were used in the experimental studies. These instruments work on the principle of high-frequency sound waves. ULS (Ultrasonic Level System) device and USS (Ultrasonic Sound Sensor) sensor were used to determine the characteristics of the regular waves produced by the wave generator. The sensors are positioned so that they are perpendicular to the bottom of the canal and do not enter the water. The sensors are connected to the main device, the ULS, and measure according to the sound wave principle. High-frequency sound waves are sent to the water surface by the sensors. Then, the sound waves reflected back to the sensors can be detected and the vertical distance between the water surface and the tip of the sensor can be measured. Then, the obtained measurements are transferred to the computer simultaneously.

Another measurement tool is the UVP (Ultrasonic Velocity Profiler) device and its integrated sensors. With the help of this device, which works based on the principle that high-frequency sound waves hit a moving particle in the liquid and return repeatedly, the flow velocities along the profile are determined in any cross-section. By using UVP sensors, time-dependent ground movements (scour / deposition) are recorded sensitively. With the help of the UVP device and its associated sensors, scour/deposition depth measurements were successfully carried out. The validation of this UVP device was already carried out and published in Guney et al. (2013). The positioning of the devices is shown in Figure 2.

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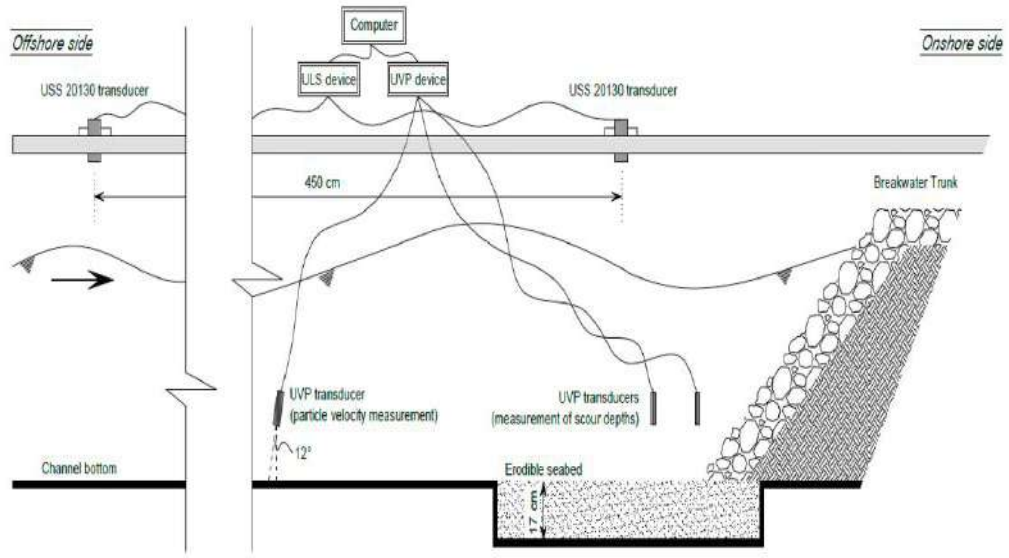

Figure 2. *Location of the ultrasonic devices during the experiments.*

DISCUSSION

As a result of the experiments, the decrease in the maximum scour depths in the case of broken waves can be seen in Table 1. There is an approximately 77 percent decrease in the maximum scour depth for Test 1. S_{max} = 5.19 mm for the broken wave case, S_{max} = 23.02 mm for the unbroken wave case. Similarly, Test 2 and Test 3 show a dramatic reduction in the maximum scour depths. This situation should be taken into consideration in the design process. In this way, damages to the breakwater can be minimized by reducing the incoming wave effect.

Table 1. *The maximum scour depths for three of the experiments.*

Test Number	d_{50} (mm)	Wave Period 'T_W' (s)	Slope	Smax (mm) in the case of broken waves	Smax (mm) in the c unbroken waves
1	1.85	3.1	1:1.75	5.19	23.02
2	1.85	2.3	1:1.75	0.00	17.04
3	1.85	2.7	1:1.75	9.94	27.17

The time-dependent scour depths obtained from the UVP devices in the case of the broken and unbroken wave case, are given in between Figure 3 and Figure 5. The unbroken wave data in those figures belong to the experimental studies performed in the same channel previously. This means the time-dependent variation of the scour for both cases was obtained by the same method. There is a significant reduction in scour depths in the case of the broken wave case compared to the unbroken wave case as can be seen in between Figure 3 and Figure 5. Since the broken of waves causes a significant reduction in scour depth, it will be beneficial to pay attention to this situation in the construction process of breakwaters. In addition, the numbers greater than zero represent "scour", while the numbers less than zero represent "deposition" in those figures. As can be seen in those figures, experimental measurements took approximately one hour.

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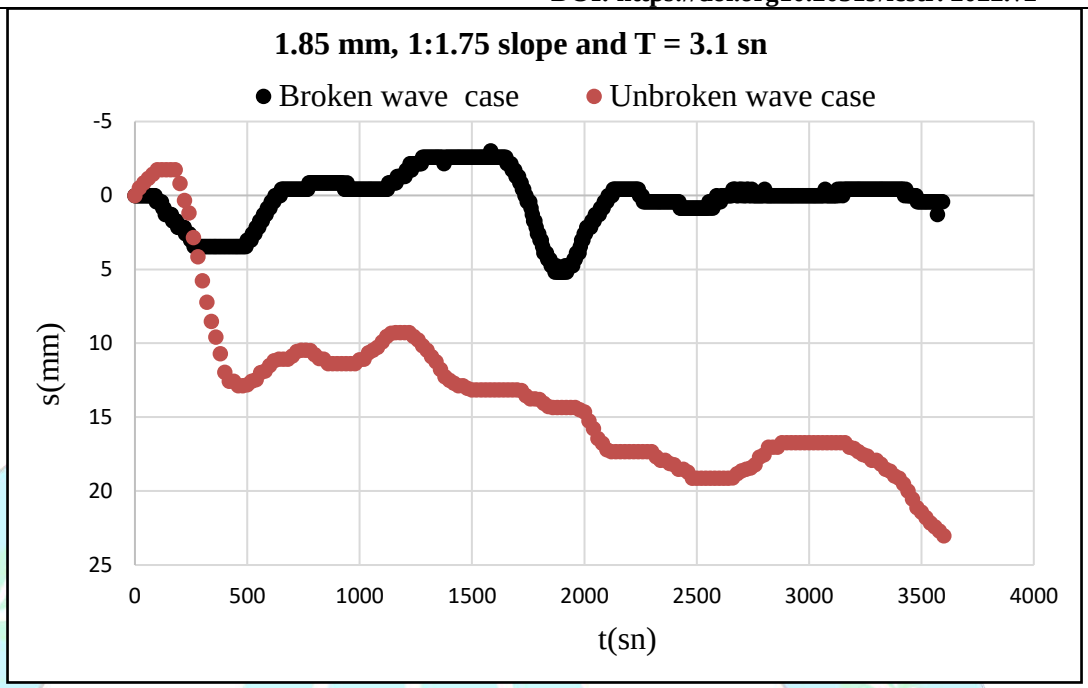

Figure 3. *Time-dependent scour depths in the case of broken and unbroken waves.*

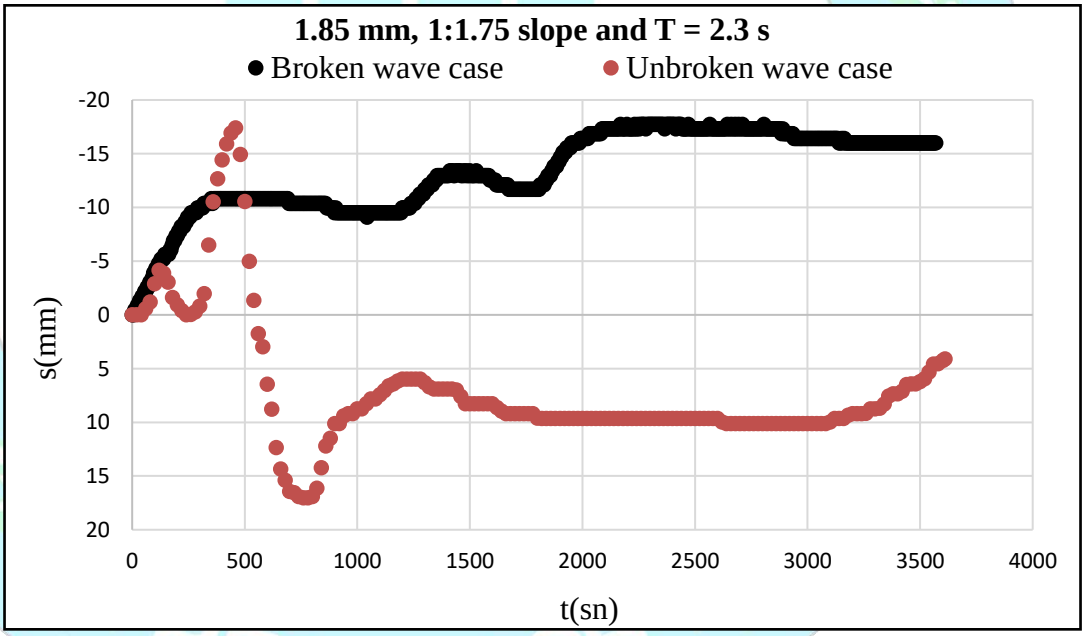

Figure 4. *Time-dependent scour depths in the case of broken and unbroken waves.*

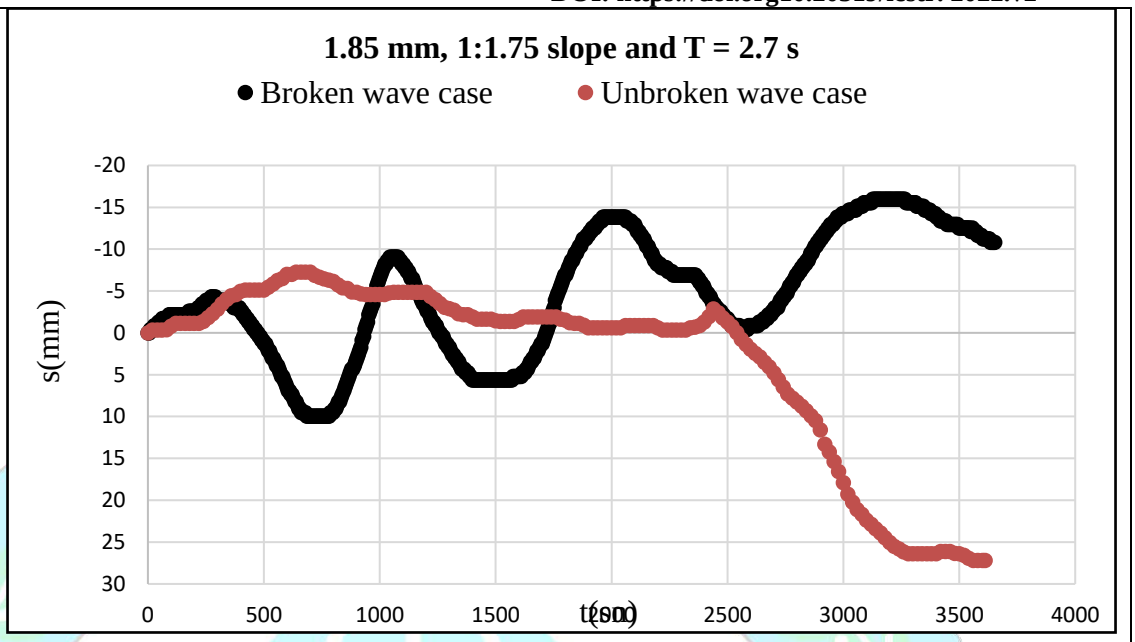

Figure 5. *Time-dependent scour depths in the case of broken and unbroken waves.*

CONCLUSION

In this experimental study, local ground movements were examined as a result of the broken and unbroken wave effect around the trunk section of a rubble-mound breakwater. The experiments were carried out for two different surface slopes with two different sand materials, and five different wave periods. The waves produced by the wave generator were broken with the help of the ramp. Consequently, it was observed that scour reduced significantly in the case of the wave broken case compared to the unbroken case. Furthermore, the scour occurs in two different stages as scour development and equilibrium stage as a result of the experiments.

ACKNOWLEDGEMENTS

The authors thank to the Scientific and Technological Research Council of Turkey (TUBITAK) for supporting the study through the project 218M445.

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Kazuki Hiro
ERCICSTR2208063

An Application of a Berthelot Method using a Metal Tube to Inactivation of Bacillus Subtilis

Kazuki Hiro
Department of Mechanical Engineering, National Institute of Technology, Nara College, Yamato Koriyama, Nara, Japan

Abstract

Negative pressure of liquids is expected to inactivate bacteria by the pressure which is much lower in magnitude than positive pressure. Nevertheless, the pressure is difficult to be generated experimentally due to cavitation through heterogeneous nucleation. In order to check the expectation, a metal Berthelot tube was newly developed, solutions including bacillus subtilis experienced negative pressures repeatedly, and numbers of colonies were counted by an agar dilute plate method. Results indicated that numbers of colonies which experienced negative pressures were less than those for non-treatment, and reduction rates increased with numbers of repetition. A new means of inactivation of bacteria without any

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chemical compounds was found.

Keywords: Negative Pressure of Liquid, Berthelot Method, Cavitation, Inactivation of Bacteria

1. Introduction

Negative pressure of liquids has been important basically in fields of science and technology. For example, it has been said that the environmental stress cracking of the polymers is caused by increases in mutual solubilities between polymers and liquids as their non-solvents which undergo negative pressures (Okamoto & Ohde, 1986). However, studies on negative pressures have not been reported in comparison with those on positive pressures. The reason is that since liquids under negative pressures are thermodynamically metastable, the liquids tend to form cavities through heterogeneous nucleation. The phenomenon is called cavitation.

Of a few experimental methods, a Berthelot method using a metal tube seems to have potential as a means of studying liquid behavior under negative pressure though it may have some drawbacks (Ohde et al., 1989a). The reason for the potential is that the method is capable to generate static negative pressure for not too small liquids in volume enclosed in a solid metal. Hence, metal Berthelot tube techniques for generating negative pressures up to ca. -20 MPa for water and some organics of ca. 1 cm^3 have been developed (Ohde et al., 1993) and has contributed to reveal properties such as phase diagrams including negative pressure regions of thermotropic liquid crystals (Ohde et al., 2008).

An interesting stability diagram for a kind of bacteria has been reported in a biological system (Smeller, 2002). The diagram of E. Coli. seems to be partly elliptical in a positive pressure-temperature plane for a lack of a negative pressure region of the plane (Imre, 2002). The bacteria are inactive out of the elliptical region in a sense that a number of the bacteria decreases by two orders of magnitude within 5 min. The elliptical bottom seems to be in a negative pressure region which is much more accessible. To authors' knowledge, there have been no studies on inactivation of bacteria in negative pressure regions.

Hence, in order to investigate inactivation effects of negative pressures, a solution including a kind of bacteria, that is Bacillus subtilis, was exposed to negative pressures as a sample liquid in a metal Berthelot tube, and a number of bacteria colonies were counted by an agar dilute plate method.

2. Experiment

A metal Berthelot method generates static negative pressure through an alternative heating and cooling procedure of a sample liquid sealed in a chamber of a solid metal tube over an appropriate temperature range (Ohde et al., 1989b) as shown in Figure 1. Since a coefficient of thermal expansion of the liquid is higher than that of the solid, the initial heating causes gases, which are both air and the liquid vapor remaining in the chamber, to be forced into the liquid so that it fills the chamber completely at a temperature T_f (Trevena, 1987). In the subsequent cooling, the liquid adhered to the chamber walls continues to fill it at temperatures below T_f. Thus, the liquid pressure becomes positive above the T_f, while negative below the T_f. At a lower temperature T_b, the liquid breaks, and cavitation bubbles appears with a sudden increase in pressure. The alternative procedure is called temperature cycle.

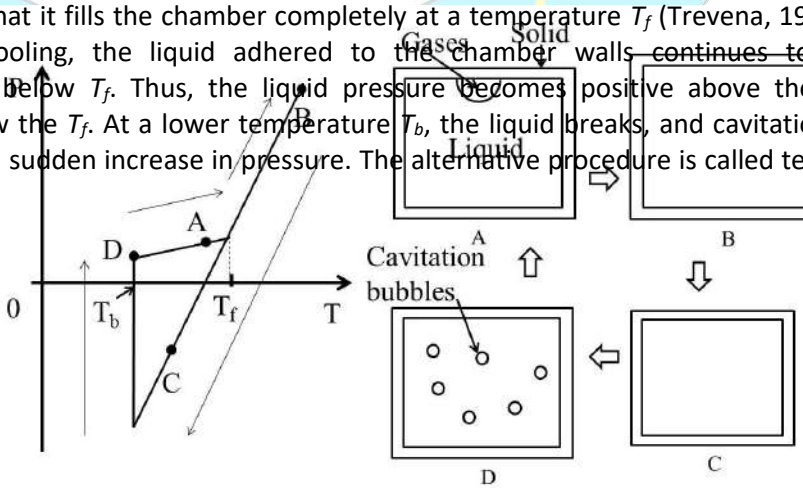

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Figure 1: *Berthelot method; (a) a relation between pressure and temperature (b) a liquid in a chamber*

Figure 2 shows a newly developed metal Berthelot tube for this study. The Berthelot tube consisted of main five parts, namely a screw, a socket, a nut, a ball and a pressure transducer having a specimen chamber of ca. 1500 mm^3. The ball was made of brass, while the others were of type 630 stainless steel.

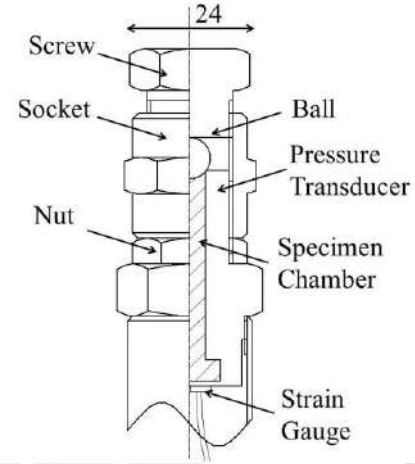

Figure 2: *Metal Berthelot tube illustrating overview (left) and inside (right)*

Sealing operation was carried out as follows: firstly, the five parts were pre-sterilized with ethanol and were dried sufficiently. Secondly, the transducer attached with two O rings for no leakage of water was held in a center of an attachable funnel shaped cylinder as shown in Figure 3. Thirdly, the socket and the nut were attached to the transducer, and a hot water of ca. 60 °C for setting T_f was poured not into the chamber but into the cylinder. Fourthly, after ca. 5 min, a solution including a kind of bacteria was poured into the chamber with a micro-pipet, and a ball was put onto a cylindrical top edge of the chamber. Finally, the ball was compressed with the screw until the ball was deformed plastically by ca. 20 Nm with a hand torque wrench. T_f was adjusted at ca. 50 °C.

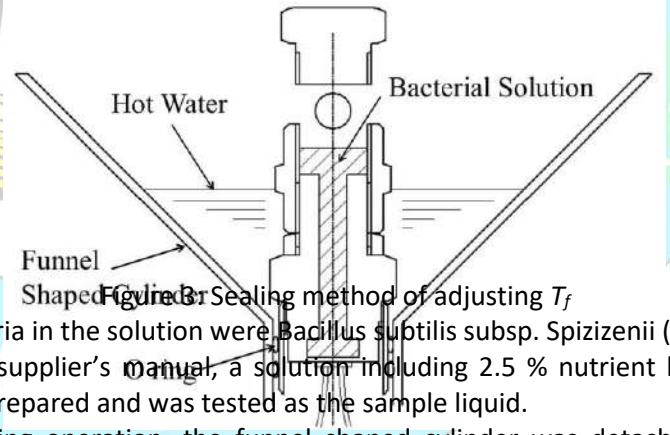

Figure 3: Sealing method of adjusting T_f

The bacteria in the solution were Bacillus subtilis subsp. Spizizenii (JCM 2499, RIKEN). According to the supplier's manual, a solution including 2.5 % nutrient broth No.2 (Kanto Kagaku Co.) was prepared and was tested as the sample liquid.

After sealing operation, the funnel shaped cylinder was detached, the tube was immersed in a hot bath, and temperature cycles were repeated automatically as shown reported before (Hiro et al., 2003). Temperature cycles were carried out in a temperature range from ca. 10 °C to ca. 55 °C. A period for a temperature cycle took ca. 5 min.

2.Results and disucussion

Figure 4 shows a trend in negative pressures for 15 temperature cycles. Negative pressures from ca. 1.5 MPa to ca. 6.5 MPa in magnitude were measured. The average and the standard deviation were 4.23 MPa and 1.54 MPa, respectively. Table 1 showed averages and standard deviations for different temperature cycles. They were almost the same values each other.

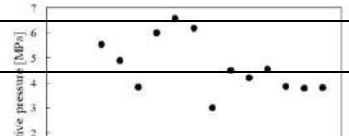

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Figure 4: Trend in negative pressures for 15 cycles

Figure 5 show typical photographs by an agar dilution plate method. In order to count a number of conies, they were marked with a black pen. Dilution rates were 10^{-9}. The number of colonies for the 15 cycles was less than those for no cycle.

Figure 5: Typical photographs by an agar dilution method, (a) no cycle (b) 15 cycle

Figure 6 shows reduction rates for different temperature cycles. A reduction rate (R) was calculated by following equation;

$$R = \frac{(N_0 - N_C)}{N_0} \times 100$$

where:

N_0 – numbers of colonies with no temperature cycles;

N_C – numbers of colonies with definite cycles.

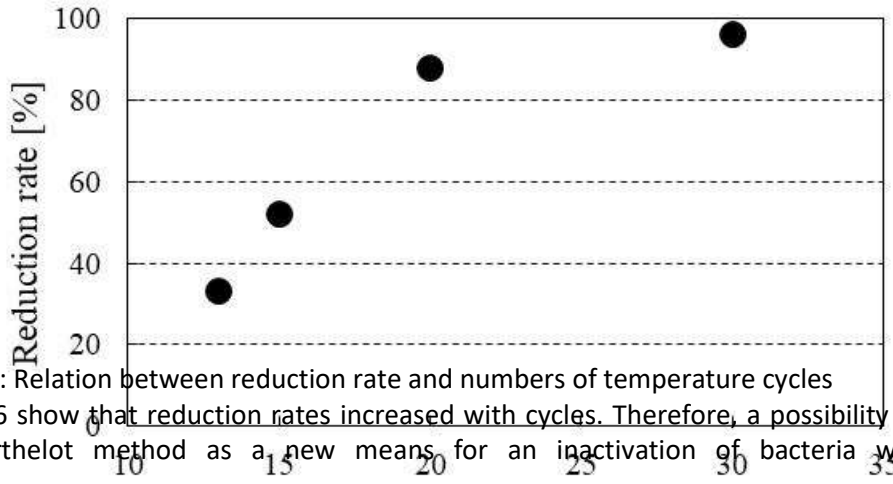

Figure 6: Relation between reduction rate and numbers of temperature cycles

Figure 6 show that reduction rates increased with cycles. Therefore, a possibility of the metal Berthelot method as a new means for an inactivation of bacteria was demonstrated.

The Berthelot method generated static negative pressures of only 4.5 MPa with temperature cycles. The cycles mean not only generation of negative pressure, but also repeated cavitation. In general, it has been known that cavitation events have inactivation effects of bacteria (Zupanca et al., 2019). The effects have been attributed to shock waves, micro jets, and chemical radicals accompanied with bubbles' collapses during extremely short times. In the present study, cavitation bubbles occurred so that the sample liquid co-existed with vapor as shown in Figure 1. Authors confirmed that it took ca. 5 sec from T_b to T_f in Figure 1(a); the bubbles disappeared slowly through dissolution to the sample liquid with the heating processes of temperature cycles. Therefore, the waves, jets, and radicals caused by the bubbles' collapses would not occur in the present study. A new method for inactivation of bacteria without any chemical compounds was found. Experiments for other bacteria will be carried out in future.

3.Conclusions

In order to check inactivation effects of negative pressures on bacteria, solutions of Bacillus subtilis underwent temperature cycles repeatedly using a metal Berthelot tube. As a result of an agar dilute plate method, numbers of colonies which underwent temperature cycles were less than those with no cycle. Furthermore, reduction rates of bacteria increased with cycles. A new means for inactivation of bacteria without any chemical compounds was found. Further work such as experiment for other bacteria will be required in future.

Acknowledgements

We would like to RIKEN for their support of bacteria and Mr. Hirotsugu Shimada for his technical support of the newly developed Berthelot tube.

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ERCICSTR2207063

Experimental Investigation of Local Scour Around Head Section of Rubble Mound Breakwater in Case of Broken and Unbroken Waves

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Abstract

Coastal structures and anchored vessels can be damaged by the effect of waves. In order to minimize these damages, long embankments called breakwaters are built to create a calm water level. The breakwaters absorb the energy of the wave before it reaches the shore, therefore reduce the wave height in the basin. However, in the trunk and head sections of

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these structures, scour and deposition occur with the effect of waves and currents. As a result of the scour, stability problems and damages can be occurred. For this reason, it is crucial to examine the scour that occurs around the breakwaters. Although there are existing studies on the head section of the rubble mound breakwater for unbroken waves, no experimental study examines the local scour under the effect of broken waves. Therefore, this paper aims to eliminate this deficiency in the literature and to examine the local scour that may cause stability losses in the breakwater for the broken and unbroken wave cases. Time-dependent scour depth and wave measurements were obtained with the help of ultrasonic devices. These devices work on the principle of high-frequency sound waves. In this study, the local scour in the head section of a rubble mound breakwater under the effect of the broken and unbroken waves was experimentally investigated. The experiments were carried out by changing three different median grain diameter sand materials (0.23 mm, 0.55 mm, and 1.85 mm), two different breakwater surface slopes (1:1.5 and 1:1.75), and five different regular waves (1.7 s, 2.0 s, 2.3 s, 2.7 s, 3.1 s). The experiments showed that no significant local scour was observed in the case of the broken waves and local scour in the case of broken waves is significantly reduced compared to the case of unbroken waves.

Keywords: Rubble mound breakwater, head section, broken waves, unbroken waves, local scour, experimental study.

INTRODUCTION

Breakwaters can be divided into many classes according to their shapes, the materials they are made of, their purpose of use, and their appearance in the plan. Foremost among them, the rubble mound breakwater is the most built in our country and the world. One of the important factors that make these breakwaters to be preferred is that the stone material to be used in the construction of the rubble mound breakwater is close to the construction site which means lower construction costs. Examining the stability losses that may occur due to local scours in these structures, which were built to create a calm water level, is of great importance in reducing the repair costs.

In literature, only a limited number of studies on the scour of breakwaters can be found. Those studies especially examined the trunk section. Sumer and Fredsøe (1997, 2000) investigated the scour in the head section of the vertical and rubble mound breakwaters. As a result, they concluded that the scour in the head section of the breakwater can be of great value as a result of these studies. Sumer and Fredsøe confirmed the results reported by Lillycrop and Hughes (1993). Therefore, the investigation of the local scour in the head section of the breakwaters has great importance. Sumer and Fredsøe (1997), in their study, experimentally examined the local scour at the head section of a rubble-mound breakwater for regular and irregular wave conditions. They showed that there are two main mechanisms causing the local scour in the head section of the rubble mound breakwater. The first mechanism is the local scour induced by steady streaming. The other is the local scour caused by plunging breaker.

In the present study, the experiments in the case of broken waves were planned to be carried out by changing three different median grain diameter sand materials (d_{50} = 0.23 mm, d_{50} = 0.55 mm, d_{50} = 1.85 mm), two different breakwater surface slopes (1:1.5 and 1:1.75), and five different wave periods (1.7 s, 2.0 s, 2.3 s, 2.7 s, 3.1 s) to find the critical parameters causing scours. Those experiments showed that no significant local scour was observed in the case of 1:1.5 slope and 0.23 mm and 0.55 mm median grain diameter conditions. Therefore, less critical test cases with a coarser grain diameter of 1.85 mm and breakwater surface slope of 1:1.75 for seabed material were not needed to test. All experiments were carried out in regular wave effect.

EXPERIMENTAL SET-UP AND METHODOLOGY

The experimental study was carried out in an existing open-wave channel with a length of 33 m, a width of 3.6 m, and a depth of 1.2 m. The experimental studies were

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carried out in the channel of Dokuz Eylul University, Hydraulics Laboratory. In the open sea part of the open channel, a plunger-type wave generator was used to form regular waves with different heights and periods. Furthermore, the trunk section of the breakwater which was used in previous experiments and located on the onshore side was used to avoid the reflection of waves produced by the wave generator. A schematic view of the channel in which the experiments were carried out, is shown in Figure 1. It can be seen that regular waves created by the wave generator are broken on the ramp and then affect the breakwater. The unbroken wave experiments were carried out before the ramp was placed in the channel.

Before each experiment, some seabed materials with the thickness of d_{50} = 0.23 mm and d_{50} = 0.55 mm were located in the surroundings of the breakwater without any compaction process. After each experiment, the surface of the disturbed bed was arranged to create a horizontal surface. The seabed materials used in the experimental studies are quartz sand and have a uniform distribution. The median grain diameters of the sands used in the experiments are as follows: d_{50} = 1.85 mm, d_{50} = 0.55 mm, and d_{50} = 0.23 mm for large, medium and small grain sizes, respectively. First, the experiments in the unbroken wave state were carried out, then the ramp was located in the channel as shown in Figure 1, and the experiments in the broken wave state were started. For the broken wave state, tests with a grain diameter of d_{50} = 1.85 mm were not performed as significant scour did not occur in the cases of d_{50} = 0.23 mm and d_{50} = 0.55 mm.

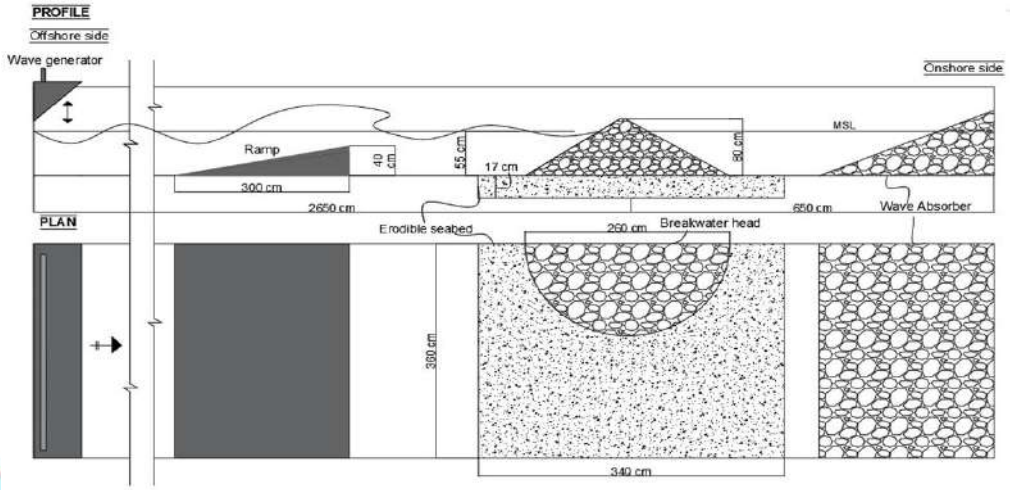

Figure 1. *Profile and plan view of the head section of the breakwater with a slope of 1:1.5 in case of the broken wave.*

The list of experiments performed is given in Table 1. It should be noted that all experiment cases are valid for the broken wave case in Table 1. A wave breaker ramp was placed in the test channel to create the broken wave condition in the experiments. On the other hand, as can be seen in Table 1, four of the nine experiments were performed for sediment particles with a median grain diameter of d_{50} = 0.55 mm, while the remaining five were carried out for sediment particles with a median grain diameter of d_{50} = 0.23 mm.

As measuring instruments, UVP (Ultrasonic Velocity Profiling) and ULS (Ultrasonic Level Sensor) were used. UVP is used to measure time-dependent scour/deposition depth. The validation of this UVP device was already carried out and published in Guney et al. (2013). For measuring water levels, ULS is used. In the study, scour and deposition depth measurements are made under the effect of broken and unbroken waves for different wave periods and seabed materials. During each experiment, scour/deposition measurements were made with the help of UVP at two different points. The positioning of UVP devices is shown in Figure 2. One of the UVP devices was placed in the region under the influence of steady streaming where waves approach the breakwater, and the other was placed at the

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lee-side of the breakwater on which the scour occurs due to plunging breaker. In Table 1, UVP_1 represents the relative maximum scour depths measured as a result of the experiment under steady streaming effect, while UVP_2 represents the relative maximum depths measured at the lee-side of the breakwater under plunging breaker effect. The positioning of the measuring devices are the same for the broken and unbroken wave cases.

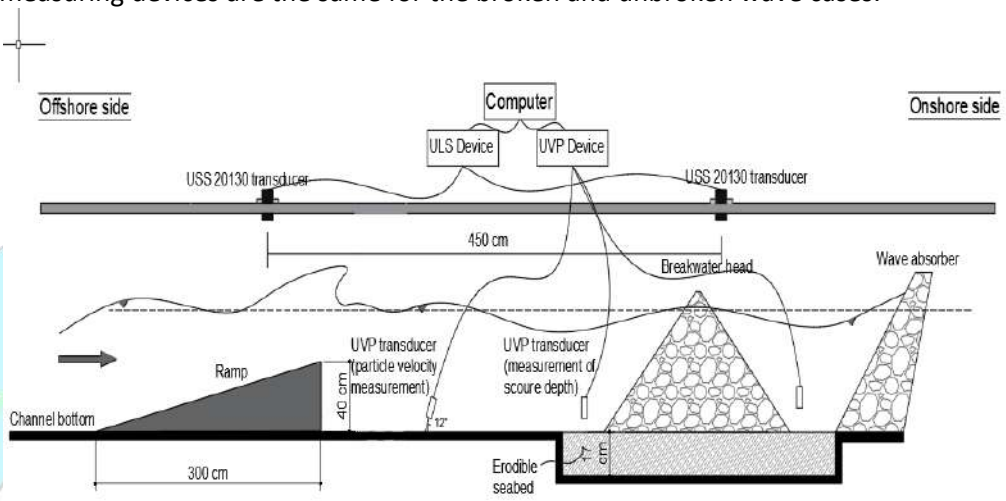

Figure 2. *Location of ultrasonic devices during the experiments.*

DISCUSSION

As a result of the experiments, the ground form was preserved in the head section of the rubble-mound breakwater under the effect of the broken waves, and a significant scour did not occur. As can be seen in Table 1, the maximum scour depth does not even exceed 15.52 mm. No significant scour occurred in the test results. Although the relative maximum scour depth exceeds 0.03 mm in Sumer and Fredsøe's experimental study for the unbroken wave state, the relative maximum scour depth remains maximum of 0.006 mm in our test for the broken wave state. This was an expected result because Sumer and Fredsøe did their study for the unbroken wave state whereas this study investigates the broken wave state.

Table 1. *The relative maximum scour depths in case of the broken wave.*

Test Number	d_{50} (mm)	Wave Period 'T_W' (s)	Smax (mm) for UVP_1	Smax (mm) for UVP_2	Smax/B for UVP_1	Smax/B UVP_2
1	0.55	1.7	2.07	6.21	0.0008	0.0024
2	0.55	2.7	7.24	11.38	0.0028	0.0044
3	0.55	2.3	0.00	11.38	0.0000	0.0044
4	0.55	3.1	4.14	1.03	0.0016	0.0004
5	0.23	1.7	9.31	14.49	0.0036	0.0056
6	0.23	2.0	7.24	7.24	0.0028	0.0028
7	0.23	2.3	15.52	7.24	0.0060	0.0028
8	0.23	2.7	0.00	14.49	0.0000	0.0056
9	0.23	3.1	4.14	6.21	0.0016	0.0024

The time-dependent scour depths obtained from the UVP devices in the case of the broken and unbroken wave case, are given in Figure 3 and Figure 4. The unbroken wave data in those figures belong to the experimental studies performed in the same channel previously. This means the time-dependent variation of the scour for both cases was obtained by the same method. There is a significant reduction in scour depths in the case of the broken wave case compared to the unbroken wave case as can be seen in Figure 3 and Figure 4. Since the broken of waves causes a significant reduction in scour depth, it will be beneficial to pay attention to this situation in the construction process of breakwaters. In

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addition, the numbers greater than zero represent “scour”, while the numbers less than zero represent “deposition” in those figures. As can be seen in those figures, experimental measurements took approximately one hour.

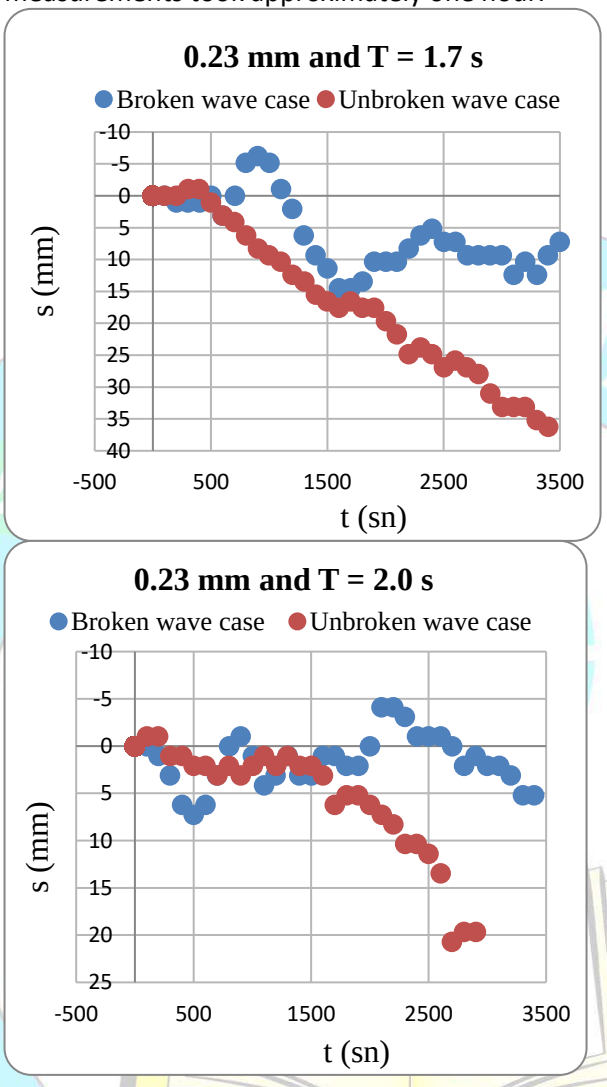

Figure 3. *Time-dependent scour depths in the case of broken and unbroken waves.*

(All measurements were taken from UVP$_2$ device)

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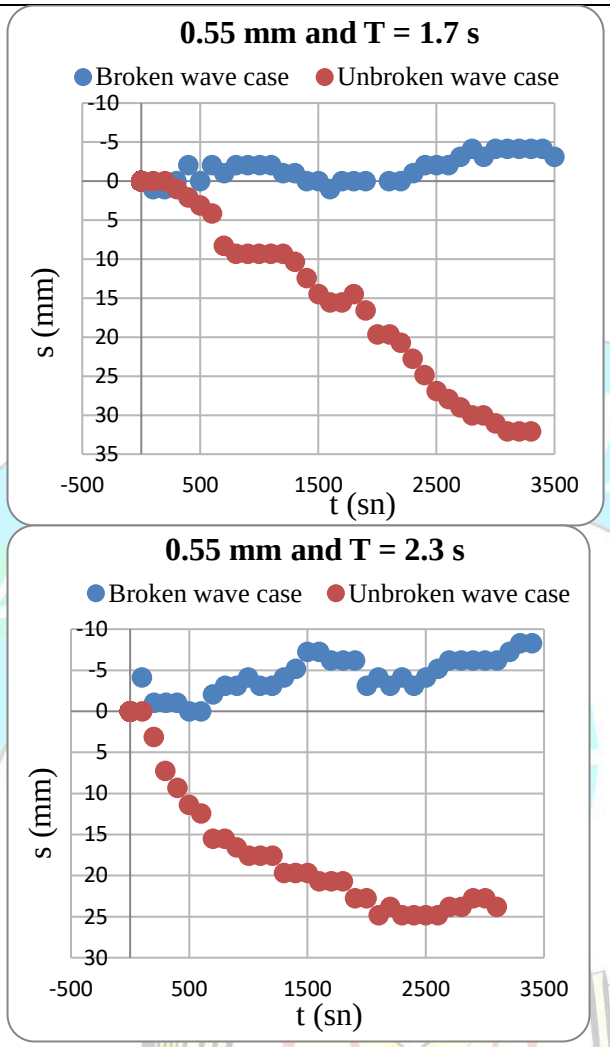

Figure 4. *Time-dependent scour depths in the case of broken and unbroken waves. (All measurements were taken from UVP$_1$ device)*

CONCLUSION

In this experimental study, the deficiency in the literature was eliminated by examining the local scour around the head section of the rubble-mound breakwater for the broken wave case. In this paper, local ground movements were examined as a result of the broken and unbroken wave effects around the head section of a rubble-mound breakwater experimentally. The experiments were carried out for a specific surface slope with two different sand materials, and five different wave periods. The waves produced by the wave generator were broken with the help of the ramp. Consequently, it was observed that scour reduced significantly in the case of the wave broken case compared to the unbroken case.

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	mound breakwater
 **Nagih Shaalan** **ERCICSTR2204056**	**Promising Novel Barium Carbonate One-Dimensional Nanostructures and their Sensing Application: Preparation and characterization** **Nagih Shaalan** Al-Bilad Bank Scholarly Chair for Food Security in Saudi Arabia, Deanship of Scientific Research, the Vice Presidency for Graduate Studies and Scientific Research, Al Ahsa, Saudi Arabia **Abstract** Among the carbonate of heavy materials, baco3 is a substance with many industrial applications [1]. It is thermodynamically stable below 1079 K compared to other heavy carbonate materials [2]. The fabrication of baco3 in nanoscale made this compound of wide applications in many technological and scientific fields. The baco3 nanomaterials have better catalytic activity than other heavy carbonate materials [3]. We describe an innovative method for making baco3 Datura-like nanostructure based on PVD using thermal evaporation in a closed system at low vacuum and temperature. In this method, different nanoforms of baco3 are produced. Here is a detailed explanation of how to manufacture this compound and the practical procedures for that. As an application, the 1D baco3 is used in the manufacture of a gas sensor for NO2 gas, which is studied at different operating temperatures and gas concentrations. It showed the ability to detect NO2 at a wide range of temperatures of 150 up to 350oc. The temperature dependence and gas concentration dependence of the sensor response were investigated. The maximum response peak was recorded at an operating temperature of 250oc. The sensor exhibits its capability to trace the increase of gas concentration. We propose here a one-pot method of thermal evaporation for novel nanostructures. A small piece of Ba with about 10 mg was withdrawn from the oil reservation bottle and placed in a glass dish in the air for 5 hours after it was dropped by ethanol drops, which made the black Ba convert to white color. Starting material of Ba was placed in the double-crucibles covered by sio2/Si substrate, which was placed in a vacuum of 0.65-0.85 torr. Then, the samples were deposited at 850oc for 30 min. The morphology of the sample prepared at a lower vacuum of 0.85 torrs, is a Datura-like structure in Image 1. Each Datura is linked with others by nanowires of 20-50 nm in diameter and 5 µm in length. Ba element was detected at various X-ray energies by EDX. The most observed lines are Ba-Lα and Ba-Lβ at 4.5 and 4.8 kev. The EDX spectra confirmed that there are no impurities are observed in the samples rather than Ba, O, and C elements, where the Si peak is due to the substrate. X-ray patterns confirmed the formation of baco3. The results suggested that NO2 reacted direct to the baco3 surface, captured the conduction electrons, reducing the free carrier density. In summary one-dimensional baco3 novel nanostructure was successfully synthesized by one-step thermal deposition through Ba as a raw source. The nanostructures were indexed on the orthorhobmic structure of baco3 with most growth directions of (111) and (200). The morphology was promising for NO2 detection. The maximum response was recorded at an operating temperature of 250oc. The sensor exhibits its capability to trace the increase of gas concentration. [1] T.W. Clarkson, CHAPTER 61 - Inorganic and Organometal Pesticides, in: R.I. Krieger, W.C.B.T.-H. Of P.T. (Second E. Krieger (Eds.), Academic Press, San Diego, 2001: pp. 1357–1428. [2] I. Arvanitidis, D. Sichen, S. Seetharaman, Metall. Mater. Trans. B Process Metall. Mater. Process. Sci. 27 (1996) 409–416. [3] T. Hong, K.S. Brinkman, C. Xia, chemelectrochem. 3 (2016) 805–813.
Meryem Ahmed **ERCICSTR2204051**	**The Effectiveness of Unmanned Aerial Vehicles (Uav) Survey Utilization Data in Building Information Modelling (Bim)**

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Abstract

This Research aid in the advancement of efficiency, cost-cutting, innovation, and technology in the field of land surveying. it studies the complexity of uav survey data, examines the differences between uav survey data and conventional land survey data, and analyze the integration of the uav survey data to bim autodesk civil 3d software. to achieve the objectives of this research, uav survey data and conventional survey data were first obtained from the industry. uav survey data and conventional survey data for the same land area were then compared from various perspectives. the coordinates of 20 points from the uav survey data were compared to points from conventional land survey data, contour maps, and a digital raised model generated using bim autodesk civil 3d software. precision and accuracy were also factors in the comparison with the help of google earth points. in terms of time, crew members, area, and data acquired, the effectiveness of both strategies was compared. the results shows that the uav survey collected 168% more data compared to the conventional survey in less time and with less manpower, making them more cost-effective in the long run, even though the initial investment may be considerable. the contours and digital raised model are more accurate and detailed than the conventional survey data because of the dense data provided by the uav survey, fewer human errors, and it is less dependent on the surveyor. in terms of coordinates, the difference between the two surveys is minor. however, the uav survey data requires high specs pc that can run software such as terr model and pix4d which are not easily available to the public.

Keywords :(Font-12 Bold) UAV Surveying, Conventional Surveying.

Muhammad Arib Alwansyah
ERCICSTR2204052

Grouping of Earthquakes in Sumatera Region Using Partitioning Around Medoids (Pam) and Clustering Large Applications (Clara) Methods

Muhammad Arib Alwansyah
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Abstract

There is a relationship between the occurrences of earthquakes between points of occurrence of earthquakes, where the results are known that there is a close relationship between earthquake occurrences between point locations. the proximity and characteristics of the point of occurrence of an earthquake can be achieved by using a cluster analysis approach. cluster analysis is a grouping method with the main objective of grouping subjects or objects based on their characteristics. cluster analysis has high homogeneity (similarity) between members in one group, high heterogeneity (difference) between one group and another. this study will classify earthquake occurrences, analyze the characteristics of the event, create earthquake zones and map them using clustering partitioning around medoids and clustering large applications analysis. the variables used in this study were latitude, longitude, depth, and magnitude of the earthquake in sumatra (1 january 1970 to 31 december 2020) obtained from the united states geological survey (usgs) website. the minimum magnitude scale used is mw 5 with a depth of 0-50 km (shallow earthquake) and a depth of 50-300 km (medium earthquake). clustering analysis of partitioning around medoids using k = 2, 3, 4,...,10 gives the optimum number of clusters based on dunn index is 3, connectivity index is 2 and silhouette index is 2, while in clustering large applications clustering using k = 2, 3, 4,...,10 gives the optimum number of clusters based on the dunn index is 2, the connectivity index is 2 and the silhouette index is 2. these results indicate that in general, the earthquake zones are at two sources. namely the subduction zone and the sumatra fault zone. thus, the sumatera region, which is on the west bank, often experiences

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	earthquakes, both small-magnitude earthquakes, and large-magnitude earthquakes. **Keywords**: Spatial Zone, Partitioning Around Medoids, Clustering Large Applications, Earthquake, Sumatera.
 **Basel Mohammad Al-Eideh** **ERCICSTR2204054**	**Moment Approximation of Life Table Survival Model Using a Force of Mortality follow a Birth and Death Diffusion Process with General External Effect** Basel Mohammad Al-Eideh College of Business Administration, Dept. of Information Systems and Operation Management, University of Kuwait, Showaikh, Kuwait **Abstract** One of the important functions of the demographers is to provide information on the trend of the life-table survival function, which is important to plan for human activities. Today, demographers are interested in describing phenomena in theoretical models involving population structure by considering the stochastic analogs of classical differences and differential equations. In this paper, the life-table survival function is considered using a force of mortality follow a birth and death diffusion process with general external effect process. The moment approximation as well as the mean and the variance of such a process are derived. Also, the moment approximation for some external effect distributions of beta and exponential, as well as for the case of no external effects are obtained. These results are useful in studying the behavior of the process and in statistical inference problems. The objective of this research is to identify critical knowledge types required by demographers of life-tables functions through building a stochastic survival model that has never been examined before as far as I know. The results should be very useful and will benefit the demographers and others to study the behavior of the number of survivors through different applications. **Keywords:** Life-Table Survival Function, Force of Mortality Process, Birth-Death Diffusion Process, General External Effect, Moment Approximation, Mean and Variance**.**
Bukhary Ikhwan Ismail **ERCICSTR2204055**	**Review of Vibration-based Surface Classification for Wheeled Robots in Palm Oil Plantation** Bukhary Ikhwan Ismail IOT Systems, Mimos Berhad, Kuala Lumpur, Malaysia **Abstract** Palm oil can grow in almost flexible topography. On flats, slopes, hilly, or undulating areas and whether on inland or reclaimed coastal areas. This makes the plantation environment unique with various soil types & surfaces. Each surface has a unique physical characteristic that directly influences the driving, handling, power efficiency, stability and safety of the robot. A mobile robot should have knowledge not limited to obstacles, but also the surface that the robot navigates in order to estimate wheel slippage and apply corrective measures. This paper discusses the harshness factors in palm oil plantation estate and the effects on wheel traction. We then present our review on several vibration-based surface classification techniques. Based on our survey, a combination of multimodal sensory for surface classification is more suitable for palm oil plantation settings. **Keywords:** Surface Classification, Terrain Classification, Wheel Robot, Vibration, Palm Oil
Mrs. Anjali Sharma **ERCICSTR2204057**	**Load Balancing Scheme with the Public Cloud Computing Environment: An Extensive Outline** Mrs. Anjali Sharma Computer Science, IIMT University, Meerut, India

Dr. P.K. Gupta
Computer Science, IIMT University, Meerut, India

Abstract

In today's organization frequently used the most powerful expertise to do their work in an efficient mode that technology is called cloud computing, which offer a platform for storing data as pay-per-use and also accessible all time for every person over the internet. In the time of lockdown, the use of this technology enhanced day by day so it has more concern related to security, failure rate and most critical load balancing. So, this research paper has given an idea in the area of load balancing and recommends a proposal how to overcome this load problem on every node during the work. Cloud computing is having a verity of load such as extra CPU burdens, extra memory burdens, extra network and bandwidth related burdens, through this idea we can minimize the load on nodes when nodes are over burdened with many jobs. By this technique load must be hold and disperse when nodes are overloaded. As we are having two main loads balancing approaches such as static load balancing and dynamic load balancing and this proposal works accordingly as demands in the Cloud Computing technology. This paper offers an idea to overcome the problem of over burdens on nodes by public cloud by doing cloud parts in form of partitions which assist a control mechanism by selecting alternative strategies for different situations.

Keywords: Dynamic algorithms, Static algorithms, Public Cloud

Ahmidah Elgali
ERCICSTR2205051

An Industrial SCADA System Remote Control Using Mobile Phones

Ahmidah Elgali
Maintenance Department, Sirte Oil Company, ElBrega, Libya

Abstract

SCADA is the abbreviation for "administrative control and data acquisition." scada frameworks are generally utilized in industry for administrative control and information securing of modern cycles. regular scada frameworks use pc, journal, slim client, and pda as a client. in this paper, a java-empowered cell phone has been utilized as a client in an example scada application to show and regulate the place of an example model crane. the paper presents a genuine execution of the on-line controlling of the model crane through cell phone. the remote correspondence between the cell phone and the scada server is performed through a base station by means of general parcel radio assistance gprs and remote application convention wap. this application can be used in industrial sites at areas that are likely to be exposed to a security emergency (like terrorist attacks) which causes the sudden exit of the operators, however, no time to perform the shutdown procedures for the plant. hence this application allows shutting down units and equipment remotely by mobile, and so avoids damage and losses.

Keywords – Control, Industrial, Mobile, Network, Remote, SCADA.

Ahmad Saad
ERCICSTR2205052

An Industrial Scada System Remote Control Using Mobile Phones

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School of Engineering, Ajdabiya University, Ajdabiya, Libya

Abstract

SCADA is the abbreviation for "administrative control and data acquisition." scada frameworks are generally utilized in industry for administrative control and information securing of modern cycles. regular scada frameworks use pc, journal, slim client, and pda as a client. in this paper, a java-empowered cell phone has been utilized as a client in an example scada application to show and regulate the place of an example model crane. the

	paper presents a genuine execution of the on-line controlling of the model crane through cell phone. the remote correspondence between the cell phone and the scada server is performed through a base station by means of general parcel radio assistance gprs and remote application convention wap. this application can be used in industrial sites at areas that are likely to be exposed to a security emergency (like terrorist attacks) which causes the sudden exit of the operators, however, no time to perform the shut down procedures for the plant. hence this application allows shutting down units and equipment remotely by mobile, and so avoids damage and losses. **Keywords:** Control, Industrial, Mobile, Network, Remote, SCADA.
Reza Sadeghi **ERCICSTR2205053**	**Using Phase Change Materials and Effect of U-Value Factor on Building Envelope using Design Builder** Reza Sadeghi Department of Mechanical, Energy, Management and Transport Engineering (DIME), University of Genova, Genova, Italy **Abstract** The Purpose of this paper is to discuss the different types of external walls with and without phase change materials on building envelope. also, drawbacks of different phase change energy storage materials and investigate its application in buildings being discussed. the amount of energy that reduced using different types of materials in external walls were reviewed. through years of research and development, these materials have found application in smart energy buildings, greenhouses and laboratories. the problems in practical application and development direction of the future were put forward. **Keywords**-Component; Formatting; Phase Change Materials, External Walls, Energy Consumption**.**
 **Olalekan Ezekiel Ajayi** **ERCICSTR2206051**	**Globalization Versus E-Commerce: An Exploratory Study** Olalekan Ezekiel Ajayi Business Administration- Faculty of Management Science, Ajayi Crowther University, Oyo, Nigeria **Abstract** Globalization and fourth-generation technologies such as the Internet and electronic commerce are examined in this study. Business-to-business e-commerce and business-to-customer. E-commerce are affected differently by globalization, with highly global firms more likely to engage in business-to-business transactions but less likely in business-to-customer ones. The relationship between globalization and e-commerce is complex and multifaceted. Companies with a worldwide reach use technology more often and across a larger variety of e-commerce activities than smaller companies. The fourth industrial revolution (4IR) was marked by a dramatic shift in the global economy as a result of globalization. Trade barriers are being lowered, transportation and communication costs are falling, manufacturing processes are becoming more fragmented, and information and communication technology (ICT) advances are enabling new investment opportunities by opening up new markets and enabling access to new raw materials and resources as a result of globalization. **Keywords:** Globalization, New Economy, E-commerce, firm performance

Nurudeen Oyegbenga Oyeleke
ERCICSTR2206052

Small Furnace Experiments for Wood Burning Pyrolysis Models

Nurudeen Oyegbenga Oyeleke
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Abstract

This article presents a study focused on the fire resistance of steel structures when solid wood cladding or OSB panels are used. The measured properties of wood at elevated temperatures are presented. Wood pyrolysis is studied with the use of available procedures for calculating the influence of pyrolysis on fire development. The development of the charred layer is studied as a desirable part that fills the insulating layer. When this effect is shown in the experiments, the charred layer slows down the heat transfer to the structure. The charred layer will last on the steel member throughout the investigation or will fall off and expose the steel member to more rapid heating. The paper presents insights identified in previous research. Our study proposes advanced procedures for predicting the charring layer. By calibrating the thermal characteristics of the wood, a method is established to address the analysis of a charred wood layer exposed to fire. The study presents the influence of input data on the accuracy of the charred layer calculation, the development of pyrolysis, i.e., the fire protection effect on the structure or on the progress of the fire.

Keywords: Wood pyrolysis; Charred layer; Fire resistance; Steel structures; Cladding; OSB panels.

Hakeem Omobola Adejumo
ERCICSTR2206053

Trends in the Addition of PET and Natural Fibers to the Concrete- Steel Reinforcement System

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Abstract

Due to the nature of the aggregates used in the manufacture of concrete and therefore of the concrete- steel reinforcement system, as well as its growing demand, a negative environmental impact has been caused on the planet. Therefore, at present green alternatives are sought that can reduce the negative impact of the construction industry particularly concrete, some of these alternatives with greater positive impact are: the addition of natural fibers of vegetable origin and the addition of polymers such as recycled Polyethylene Terephthalate (PET), because both materials abound on the planet, they are easy to obtain, and positively impact the environment by reusing them, reducing the use of raw material and energy invested in the elaboration of concrete, which in turn cause the increase in Greenhouse Gases (GHG). Therefore, from this work of review of the state of the art and published trends involving the use of PET and natural fibers in concrete, the effect that the addition of these fibers has on the properties of the concrete-reinforcing steel system, and its impact on the construction industry, was determined. The effect on mechanical properties was mainly reviewed, however, recent studies show that electrochemical properties such as the susceptibility to corrosion of the reinforcing steel embedded in the concrete are also affected, because the presence of oxides on the reinforcing steel causes cracking, weakening the structures, causing a sudden failure of them. However, it is known that this corrosion process mainly affects structures exposed to saline environments such as bridge piles immersed in the sea. Therefore, the study of the concrete-reinforcing steel system and its modification through the addition of natural fibers or polymers partially replacing natural aggregates such as gravel and sand remains of the utmost importance, in order to reduce on the one hand, the environmental impact caused by the exploitation of the natural mantles from which the aggregates are obtained and on

	the other hand increase the life time of the concrete-reinforcing steel system. This approach is promising especially if one takes into account the results in the literature, which positively point to the addition of PET and natural fibers, since it has been determined that they increase some mechanical and electrochemical properties depending on the form and quantity in which it is incorporated into the concrete mixture. Keywords: Concrete; Polyethylene terephthalate (PET); Natural fibers; Mechanical properties; Electrochemical properties
 **Romanda Eberechi Nickson** **ERCICSTR2206066**	**Change Management** Nickson Roanda Eberec Department Business Administration, Faculty of Management Sciences **Abstract** Every organization that is engaged in technological as well as non-technological innovation will transform itself into a successful organization. At the extreme ends of the innovation process – generation and implementation of ideas – organizations and their managers need to develop an effective and effective Change Management Strategy to be effective and effective in managing that change. Professionals and stakeholders are frequently asked to develop attitudes and personal skills for change implementation, as well as a technical understanding of how to use change management tools. This article will discuss the challenges that Organizations and owners of businesses face when implementing change. Well-known theories and literature will also be discussed to shed light on the importance of change management in organizations. Many organizations face a need for change in their daily operations, but their outlook for change differs. The main purpose of this research is to critically evaluate the effect on corporate goals and objectives from the organizational viewpoint of view of change and change management. It focuses on a factor that can cause internal or external changes, which determines the kind of change and the performance of organizations in different countries. It also sheds light on the concepts and applications of change management and different models of change. From 2019 to date all the countries of the world experience a great change to the pandemic that leads to depression and economic meltdown but many still find a way to get out of this and when many designs strategies to be out of this, this is a simple analogy of change both in the private and public sector of the world. **Keywords:** Corporate goals, Change Management, Organizational Change, Organizational Performance
Ghada Salama **ERCICSTR2206054**	**STEM; Story Telling Engineering for Minors** Ghada Salama Chemical Engineering, Texas A &M, Qatar **Abstract** Researchers have studied and found that stereotype images including science and engineering are formed at an early stage through socialization. Not only through family, friends and teachers but through media, software, games and storybooks. A contribution to introduce STEM to children in this region, our engineering students at Texas A&M Qatar have participated in three projects to produce a series of books on engineering. These stories touch upon different concepts in a simplified way. The story lines and illustrations are done so children can relate to in terms of their culture and traditions. This paper will present the process of the creation of one of these storybooks, which introduces the concept of water treatment.
Bukhary Ikhwan	**Review of Vibration-based Surface Classification for Wheeled Robots in Palm Oil Plantation**

Ismail **ERCICSTR2204055**	Bukhary Ikhwan Ismail IOT Systems, Mimos Berhad, Kuala Lumpur, Malaysia **Abstract** Palm oil can grow in almost flexible topography. On flats, slopes, hilly, or undulating areas and whether on inland or reclaimed coastal areas. This makes the plantation environment unique with various soil types & surfaces. Each surface has a unique physical characteristic that directly influences the driving, handling, power efficiency, stability and safety of the robot. A mobile robot should have knowledge not limited to obstacles, but also the surface that the robot navigates in order to estimate wheel slippage and apply corrective measures. This paper discusses the harshness factors in palm oil plantation estate and the effects on wheel traction. We then present our review on several vibration-based surface classification techniques. Based on our survey, a combination of multimodal sensory for surface classification is more suitable for palm oil plantation settings.
Mahdiye Bazargani **ERCICSTR2207052**	**The Effect of Changes in The Percentage of Cocoa and Whey Powder at The Formulation Of 74% Dark Cocoa Product on Its Taste, Chemical and Microbial Factors in A Batching System During A Certain Period of Time** Mahdiye Bazargani Department of Chemistry, Sharif University of Technology, Tehran, Iran **Abstract** In the present study, the impact of changes in cocoa and whey powder at the formulation of 74% dark cocoa product were investigated in terms of its taste, chemical and microbiological factors. The optimum results were observed in % 31.9 percentage of cocoa powder and % 10.2 of whey powder regarding better taste and better outcomes in chemical analysis, then microbiological factors remained at standard level as well. During 70 days at 56 tests these variations were analyzed in a batching system, moisture, insoluble acid in ash, peroxide index of extracted oil and acidity of extracted oil were tested during this period. In all experiments the results getting close to maximum standard by ending this time except acidity of extracted oil. All sample preparations were done in pilot-scale chocolate line, ball mill refiner and pilot scale refiner for chemical and microbiological equipment the usual laboratory equipment were applied. **Keywords:** Dark Cocoa Product, Chemical and Microbiological Experiments, Ball Mill Refiner.
Natalia Escobar **ERCICSTR2207055**	**Relationship Between Typologies of Family Agri-Food Production with Functional Groups of Entomofauna and Soil Quality Indicators in the Colombian Mid-Tropics** Natalia Escobar Faculty of Agriculture Science, University of Cundinamarca, Fusagasugá, Colombia **Abstract** In the present study, the impact of changes in cocoa and whey powder at the formulation of 74% dark cocoa product were investigated in terms of its taste, chemical and microbiological factors. The optimum results were observed in % 31.9 percentage of cocoa powder and % 10.2 of whey powder regarding better taste and better outcomes in chemical analysis, then microbiological factors remained at standard level as well. During 70 days at 56 tests these variations were analyzed in a batching system, moisture, insoluble acid in ash, peroxide index of extracted oil and acidity of extracted oil were tested during this period. In all experiments the results getting close to maximum standard by ending this time except acidity of extracted oil. All sample preparations were done in pilot-scale chocolate line, ball

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mill refiner and pilot scale refiner for chemical and microbiological equipment the usual laboratory equipment were applied.

Keywords: Dark Cocoa Product, Chemical and Microbiological Experiments, Ball Mill Refiner.

Līga Proškina
ERCICSTR2207058

The Effect of Sapropel-Based Feed Additives on Broiler Growth and Economic Performance

Līga Proškina
Faculty of Economics and Social Development, Latvia University of Life Sciences and Technologies, Latvia

Abstract

The efficient use of feed is the main reason for the production of intensive poultry products. Therefore, cheaper feed additives that are equivalent in their biological value to traditional feed are being sought. To improve the safety of food for human consumption, scientists need to develop new feeding strategies for birds to reduce the risk of gastrointestinal diseases and increase economic efficiency. The study of the compound of natural humus - sapropel, which was obtained from the depths of the Latvian lake, was carried out on the farm Valmiera Agro Ltd. The aim of the study was to prove the effect of sapropel on the growth rate and carcass quality of broiler chickens. The 107 one-day-old broiler chickens of both sexes (Ross 308) were purchased from Joint stock company of Poultry Ķekava for research. Broiler chickens were randomly divided into three groups: the control group (37 chickens) and two research groups of 35 chickens each. At the start of the study, broiler chickens were fed only basic feed and watered clean water for the first 7 days. After an acclimation period of 15 days, two research groups of broilers are fed a basic feed with a constant addition of sapropel (3% and 5%). The 2nd research group broiler chickens to which sapropel 5% has been added to the diet, showed better daily weight gain (77.3 ± 1.40 g), feed conversion (1.55 kg) and carcass yield (77.8 ± 0.35%) than control and 1st group of broiler chickens and decrease in the product unit cost (15.34-37.06%) as well as an increase in the production efficiency factor (8.70-48.54), compared with the control group.

Keywords: Broiler Chickens, Sapropel, Growth Rate, Feed Conversion, Carcass Yield

Deep Shikha
ERCICSTR2207060

Role of cholesterol in TRPM8 Localization in Membrane Micro-Domains

Deep Shikha
School of Biological Sciences, National Institute of Science Education and Research, Jatni, India

Abstract

TRPM8 is a thermosensitive cation channel belongs to the transient membrane potential family. TRPM8 is activated by low temperature (less than 23˚C) as well as by different cooling compounds such as menthol and icilin. The role of membrane lipids including PI2P and cholesterol is known to be necessary for functional regulation of transmembrane proteins. In this work we explored the evolutionary conservation and interaction of cholesterol with TRPM8 by using sequence analysis and molecular docking. The in-vitro dynamics of TRPM8 on the neuronal cell membrane in cholesterol-reduced condition was performed by immunostaining. The study suggests that reduction of cholesterol on the membrane interfere with the TRPM8 localization on the membrane micro-domain. TRPM8 modulation by pharmacological agents and/or reduction of cholesterol, both cause altered localization of TRPM8 in membrane micro-domains at different efficiency. The results indicate that TRPM8 favors lipid raft localization preferably in ligand-bound state, especially in cholesterol reduced condition. This finding indicates the involvement of membrane cholesterol in TRPM8 structure-function and regulation. These findings may also be important for patients undergoing long-term cholesterol-reducing medication and other related disorders.

Shafiq Ur Rehman
ERCICSTR2207061

The Shafiq Ur Rehman Son of Abdul Hakeem Winner, Conqueror, Designer, Owner, Weather and King of World Hybrid Solar, Geothermal Wind Energy Safety System for Plant from the Electricity Hybrid Safety Department System

Shafiq Ur Rehman
Hybrid Engineering, Karachi, Pakistan

Abstract

The main purpose of my research and development is that is to educate the discover the hybrid Bengali language that every Spanish language are related to with other language with respect to native language and Bengali language with respect to Physical and Biological Science language. The hybrid language is basically hybrid Bengali language which are being developed more than five languages with respect to physical and biological science. The hybrid Bengali language composed of nth people of the World with respect to order and disorder more than six billion people of the World of Science and Technology other many Bengali language translator. This is my discovery that Every language is a hybrid Bengali language whether it is animal and human with respect to Physical and Biological Science. Because these Bengali languages are related to each other just like Bengali language are related to each other and other language which are related to each other. In this research, I analyzed that the role of Bengali language is very important in the realm era because of inheritance, ancestors and other people of the world of Science and Technology. The roles of hybrid Bengali language are used to negative and positive purpose of the people of the world. Bengali are related to the each other

Keywords: Hybrid Bengali language, Hybrid Bengali language Structure, Hybrid Bengali language

Shamoona Jabeen
ERCICSTR2207064

Fixed Point Results of Reich Contraction in Fuzzy Metric Spaces Endowed with Graph

Shamoona Jabeen
Department of Mathematics, University of Science and Technology, Bannu, Pakistan

Abstract

In this paper, we define a new class of Reich type contractions in the framework of complete fuzzy metric spaces satisfying the graph preserving conditions. A large number of different types of contractive mappings formulated using directed graphs in literature satisfy the presented contractive condition. Our main result is a nat- ural generalization from fuzzy metric spaces to fuzzy metric spaces with a graph and enriches our knowledge of fixed points in such spaces. The results are further validated with the examples and application.

Nishant Dubey
ERCICSTR2208057

Role of Sex Steroids in TRP Ion Channel in Peripheral Neurons

Nishant Dubey
Phd Student in School of Biological Science, National Institute Science Education and Research, Bhubaneswar, India

Abstract

In many biological systems, steroids exert a rapid cell signaling event suggesting a non-genomic effect, where Ca2+-ion channels are expected to be involved. However, the molecular targets and mechanisms involved in such function are not well characterized. These ion channels are involved in physiological disorders ranging from pain to cancers, and thus are also the molecular targets for various diseases and drugs. The membranous environment surrounding ion channels can be influenced by specific lipids, sterols, and steroids which in turn may affect the ion channel function and/or gating. In this work, we

	explored the effect of steroids on a non-specific calcium ion channel that also has a large number of point mutations, each causing specific pathophysiological disorders. Docking of different cholesterol intermediates and steroids with wildtype of the ion channels and its different point mutants were performed using the YASARA suit. These interactions were further confirmed by spot blot assay using steroids and the non-specific calcium ion channel fragment. gCAMP-based Ca2+-sensor was used for imaging the rapid steroid-mediated changes in intracellular Ca2+-levels in real-time in F11 cell lines. The docking results indicate different pockets where different steroids can interact. Their binding energy distribution were similar with respect to each other. Spot blot assay confirms the interaction at the experimental setup. The binding was able to affect the functioning of the calcium ion channel as seen in calcium imaging. Steroids may interact with calcium ion channels and may cause direct activation or indirectly by changing the membrane fluidity. Binding of steroids to multiple pockets on the channel and affecting channel gating is feasible. This suggests a possible mechanism of the non-genomic action of steroids on the calcium ion channel.
Ali Dehghan **ERCICSTR2208058**	**Evaluation of the Processes and Factors affecting the Establishment of Technology Management System** Ali Dehghan College of Business, University of La Verne, La Verne, California, US **Abstract** Today, technology regarded as a factor in converting inputs into outputs and thus plays a role in creating added value and achieving the goals of companies and organizations. Companies and organizations' lives in the competitive market are dependent on striving to gain a competitive advantage and mentions technology as the main factor in gaining a competitive advantage. Technology, like any other company asset, must be managed. This study aims to identify and review the processes required to establish a technology management system and determine the factors affecting the establishment of a technology management system. The type of research was descriptive and survey, the data collection tool was a researcher-made questionnaire. This study's statistical population was 112 experts with experience of at least 5 years in the field of technology management. The content validity of the questionnaires revised by the supervisor and 6 university professors and managers. Cronbach's alpha coefficient of 0.899 was calculated for the factors affecting the technology management system's implementation and 0.924 for the importance of technology management processes. According to the analysis performed with descriptive statistics techniques and structural equation techniques, the factors affecting the performance of the technology management system and its functions are the processes of protection, identification, operation, selection, acquisition and learning, and organizational factors, business strategy, technology strategy, market, government and society. **Keywords:** Technology Management System, Technology Management Processes, Business Strategy
H.T. Liu **ERCICSTR2208059**	**Quenching Behavior of the Solution for the Problems with Sequential Concentrated Sources** H.T. Liu Department of Information Management, Tatung University, Taipei, Taiwan **Abstract** This article studies the diffusion problems with a concentrated source which is provided at a sequential time steps in 1 dimensional space. The problems are considered for both Gaussian and fractional diffusion operators. For the fractional diffusion case, Riemann-

	Liouville fractional differential operator is used to describe the diffusion model with rate slower than normal time scale, which is known as sub diffusive problems. Due to this sub diffusive property, the existence and nonexistence behavior of the solution will be studied. Since the forcing term will experience a concentrated source at a sequence of time steps, the frequency, the time difference and strength of the source may affect the growth rate of the solution. Criteria for these effects which may cause for the quenching behavior of the solution will be given. The existence and nonexistence of the solution are investigated. The monotone behavior in spatial will be given. The quenching behavior of the solution will be studied. The location of the quenching set will be discussed. **Keywords**: Green's function, Heat operator, Fractional diffusion equations, concentrated source
Michel Rwibasira **ERCICSTR2208060**	**Smartphone Cyberattacks: Camera and Microphone Espionage, the Logical Disabling and Physical Removal of both Camera and Microphone are Two Newly Proposed Techniques to Protect Smartphone Users' Data from Cyberthreats** Michel Rwibasira Computer Science and Information Technology, PhD Scholar at Jain University, Bangalore, Karnataka, India Dr Suchithra R Computer Science and Information Technology, (Head of Department of MScIT, Jain University), Bangalore, Karnataka, India **Abstract** Today Communication technology has grown faster compared to recent decades through a cell phone or computer. In addition, a smartphone has a camera and an internal microphone to facilitate a human being exchanging data via the internet or calls. However, an attacker uses a phone camera and microphones to install spyware and exploit all iOS versions and Android security. Moreover, it can read texts and emails, track phone calls, steal passwords, track geolocation, access the listening device on the remote host, and harvest data from mobile applications. This survey paper proposes the DFU approach as a logical disabling of the phone's camera or physical removal. Furthermore, adopting those two methods may protect a phone from Pegasus spyware that steals information via its camera and microphone. **Keywords**- IOS, Hackers, Geolocation, and DFU.

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Līga Proškina
ERCICSTR2207058

The Effect of Sapropel-Based Feed Additives on Broiler Growth and Economic Performance

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Faculty of Economics and Social Development, Latvia University of Life Sciences and Technologies, Latvia

Abstract

The efficient use of feed is the main reason for the production of intensive poultry products. Therefore, cheaper feed additives that are equivalent in their biological value to traditional feed are being sought. To improve the safety of food for human consumption, scientists need to develop new feeding strategies for birds to reduce the risk of gastrointestinal diseases and increase economic efficiency. The study of the compound of natural humus - sapropel, which was obtained from the depths of the Latvian lake, was carried out on the farm Valmiera Agro Ltd. The aim of the study was to prove the effect of sapropel on the growth rate and carcass quality of broiler chickens. The 107 one-day-old broiler chickens of both sexes (Ross 308) were purchased from Joint stock company of Poultry Ķekava for research. Broiler chickens were randomly divided into three groups: the control group (37 chickens) and two research groups of 35 chickens each. At the start of the study, broiler chickens were fed only basic feed and watered clean water for the first 7 days. After an acclimation period of 15 days, two research groups of broilers are fed a basic feed with a constant addition of sapropel (3% and 5%). The 2nd research group broiler chickens to which sapropel 5% has been added to the diet, showed better daily weight gain (77.3 ± 1.40 g), feed conversion (1.55 kg) and carcass yield (77.8 ± 0.35%) than control and 1st group of broiler chickens and decrease in the product unit cost (15.34-37.06%) as well as an increase in the production efficiency factor (8.70-48.54), compared with the control group.

Keywords: Broiler Chickens, Sapropel, Growth Rate, Feed Conversion, Carcass Yield.

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Aysegul Ozgenc Aksoy
ERCICSTR2207062

Experimental Investigation of Local Scour Around Trunk Section of Rubble Mound Breakwater in Case of Broken and Unbroken Waves

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Civil Engineering Department, Dokuz Eylul University, Izmir, Turkey

Yusuf Yasir
The Graduate School of Natural and Applied Sciences, Dokuz Eylul University, Izmir, Turkey

Mustafa Dogan
Civil Engineering Department, Dokuz Eylul University, Izmir, Turkey

Muhammed Ikbal Tortumluoglu
The Graduate School of Natural and Applied Sciences, Dokuz Eylul University, Izmir, Turkey

Abstract

Stability losses caused by the scour can lead to significant repairing cost increases in coastal structures. Sumer and Fredsøe (2002) describe the situation caused by the scour in the coastal structures as " Scour is a threat to the stability of coastal structures " (p. 6). These structures may be pipelines, bridges, breakwaters, group piles, offshore platforms, etc. The risk of the scour causing stability losses around coastal structures makes the scour a phenomenon worth examining. Since the scour can destroy the other coastal structures such as breakwaters, it makes the scour an important phenomenon. The scour in the literature is examined in two different parts of the breakwater as trunk and head sections. Most of the studies were conducted on the trunk section. In this sense, this paper aims to investigate the scour process in the trunk section of the rubble-mound breakwater for broken and unbroken wave cases experimentally. Time-dependent scour depth and wave measurements were obtained with the help of ultrasonic devices. These devices work on the principle of high-frequency sound waves. The experiments were carried out by changing three different median grain diameter sand materials (0.23 mm, 0.55 mm, 1.85 mm), two different breakwater surface slopes (1:1.5 and 1:1.75), and five different regular waves (1.7 s, 2.0 s, 2.3 s, 2.7 s, 3.1 s). As a result of the experiments, there is a notable decrease in local scour when the waves are broken.

Keywords: Rubble mound breakwater, trunk section, broken waves, unbroken waves, local scour, experimental study.

Kin Onn, Low
ERCICSTR2208054

Production of Oxygen from Aqueous Water Using the Principle of Induced Current Part 2: Properties of Oxygen and their Relationship to Einstein's Special Relativity Theory

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Abstract

Oxygen has been shown able to be released from aqueous water when the water flows through magnetic fields. Such a production process is called magnetosynthesis and it is successful when the principle of induced current took place. Oxygen produced from this newly discovered process possessed properties differently when compared to the photosynthesis process. This study can be made when the magnetosynthesis process was carried out closed to the saturation point of oxygen dissolution equilibrium in aqueous water. At the saturation point, the exchange of oxygen atoms or molecules between these two processes has happened. This interchange state allowed a unique single steep-drop characteristic to be observed. The single steep-drop characteristic of the magnetosynthesis process provides two pieces of evidence on the properties of oxygen; they are heavier by mass and higher by oxidative power. The unique properties as discovered are supported by Einstein's Special Relativity Theory. In this matter, gamma-ray flashes are thought to produce when the hydrogen-electron pairs are formed. A mechanism where gamma-ray flashes could be produced was proposed and sufficient evidence for gamma-ray flashes to occur was outlined. The gamma-ray flashes are the clue in the inter-permutable between the mass and energy. This is the clue to let the special relativity theory take a place.

Keywords: Magnetosynthesis process, Oxygen, Oxidative power, Einstein's Special Relativity Theory, Gamma-ray flashes, Aqueous water.

Sheikh Azim Ur Rashid
ERCICSTR2209052

High Accident Rate: Tool Box Meeting for on-Site Construction Productivity

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Abstract

Although the construction industry is craft-oriented, safety is the main concern on productivity on construction sites. The accident rate is one of the effective tools to understand the effectiveness of on-site safety programs. There is an inverse correlation between high accident rates and productivity on construction sites. To overcome the problem, implementing safety programs can be considered an effective tool. Accident on the site is the outcome of poor safety management that impacts the productivity of the construction on site. The high accident rate is data that reflects the overall management of the site as well as the productivity of the site.

In this report, the high accident rate is discussed as a major negative factor of on-site construction productivity. The discussion is carried along with its operational definition, description, situation, and problem modeling. Here literature review contains related theories and ideas and followed by the details of the safety program as an improvement tool. This improvement detail includes principles, objectives, and improved modeling. Reviewing a real case scenario, the whole problem-solving model is discussed in the report. Here toolbox meeting is considered an effective safety program for the onsite construction productivity.

Vyshak Shetty
ERCICSTR2209064

Power Optimization in IoT Network

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Abstract

In this paper, a methodology is proposed for reducing the consumption of power in an IoT

	device which sends data from a RFID tag to an output file. The consumption is reduced by implementing sleep mode when, the device is not required to be active, and a wakeup signal and studying the impact it has on the power consumption. An energy harvesting device is also integrated to make the device self-sustainable.
 **Pragya Sharma** **ERCICSTR2209065**	**Screening of Rosmarinus Officinalis and Moringa Oleifera Leaf Extract in Combination with Antifungals Against Candida Albicans** Pragya Sharma Biotechnology, UIET, Panjab University, Chandigarh, India **Abstract** This study aimed at investigating the biological activities of commercially available R. officinalis and M. oleifera alone and in combinations with antibiotics against yeast Candida allicins. The inhibitory effects of antibiotics on fungi were evaluated to determine MIC & IC50 of drugs and to screen for generation of multi drug resistance. Later tested antibiotics alone and in combination with plant extracts simultaneously using broth dilution methods. The minimum inhibitory concentration (MIC) was assayed using the Broth microdilution. Rosemary and Moringa were used in broth culture, significant improvements were seen in the inhibition in growth of organism. Higher concentration of extract showed much improved inhibition as compared to the lower concentrations. Significant inhibition was observed at 16, 32 and 64µl extract of Rosemary whereas in Moringa extract it was 32µl and 64µl as compared to the control. A concentration dependent inhibition of growth was observed with both the extracts in presence of 3µM(IC25) or 6µM (IC50) Fluconazole and Amphotericin B antibiotics. Results were more pronounced with Rosemary extract as compared to Moringa extract in all the combinations studied. The results of the present study provide a scientific validation for the traditional use of Rosmarinus officinalis and Moringa oleifera as an antifungal agent. Future work is needed to investigate and explore its application in the environmental and medical fields. In addition, to evaluating the efficacy of the individual ingredients separately to better understand the underlying mechanism.
Oluwatayo Olayemi Oyegoke **ERCICSTR221055**	**Traditional Methods of conflict management and Resolutions: The case of Old Oyo Empire** Oluwatayo Olayemi Oyegoke Dept of Peace Studies and Conflict, Faculty of Social Science, Faculty of Social Sciences, Ajayi Crowther University, Oyo, Nigeria **Abstract** This study examined the mechanism for conflict resolution in traditional African societies with particular reference to Old Oyo Empire in Yoruba speaking societies of the western part of Nigeria. The paper notes that conflict resolution in Old Oyo Empire provides opportunity to interact with the parties concerned, it promotes consensus-building, social bridge reconstructions and enactment of order in the society. The paper submits further that the western world placed superiority on the judicial system presided over by council of elders, kings' courts, people , and for dispute settlement and justice dispensation, posit that traditional conflict resolution techniques such as mediation, adjudication, reconciliation, and negotiation as well as cross examination which were employed by the Old Oyo Empire in the past, offer great prospects for peaceful co-existence and harmonious relationships in post-conflict periods than the modern method of litigation settlements in law courts. Therefore, recommend revert back to traditional method of conflict management and resolution because it is cheaper and friendlier.

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Hakeem Omobola Adejumo
ERCICSTR221056

Biochanin a as a Modulator of the Inflammatory Response: An Updated Overview and Therapeutic Potential

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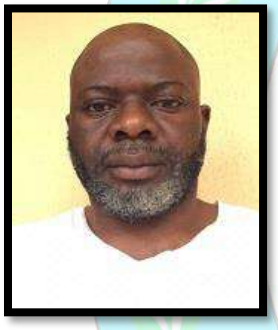
Abstract

Uncontrolled inflammation and failure to resolve the inflammatory response are crucial factors involved in the progress of inflammatory diseases. Current therapeutic strategies aimed at controlling excessive inflammation are effective in some cases, though they may be accompanied by severe side effects, such as immunosuppression. Phytochemicals as a therapeutic alternative can have a fundamental impact on the different stages of inflammation and its resolution. Biochanin A (BCA) is an isoflavone known for its wide range of pharmacological properties, especially its marked anti-inflammatory effects. Recent studies have provided evidence of BCA's abilities to activate events essential for resolving inflammation. In this review, we summarize the most recent findings from pre-clinical studies of the pharmacological effects of BCA on the complex signaling network associated with the onset and resolution of inflammation and BCA's potential protective functionality in several models of inflammatory diseases, such as arthritis, pulmonary disease, neuroinflammation, and metabolic disease.



Julius Olutayo Daramola
ERCICSTR2210057

Change Management

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Abstract

Every organization that is engaged in technological as well as non-technological innovation will transform itself into a successful organization. At the extreme ends of the innovation process – generation and implementation of ideas – organizations and their managers need to develop an effective and effective Change Management Strategy to be effective and effective in managing that change. Professionals and stakeholders are frequently asked to develop attitudes and personal skills for change implementation, as well as a technical understanding of how to use change management tools. This article will discuss the challenges that Organizations and owners of businesses face when implementing change. Well-known theories and literature will also be discussed to shed light on the importance of change management in organizations. Many organizations face a need for change in their daily operations, but their outlook for change differs. The main purpose of this research is to critically evaluate the effect on corporate goals and objectives from the organizational viewpoint of view of change and change management. It focuses on a factor that can cause internal or external changes, which determines the kind of change and the performance of organizations in different countries. It also sheds light on the concepts and applications of change management and different models of change. From 2019 to date all the countries of the world experience a great change to the pandemic that leads to depression and economic meltdown but many still find a way to get out of this and when many designs strategies to be out of this, this is a simple analogy of change both in the private and public sector of the world.

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Olalekan Ezekiel Ajayi
ERCICSTR2210058

Thematic Exploratory of Content Marketing for the Fourth Industrial Revolution

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Abstract

The marketing world is a dynamic and constantly changing environment that never stagnates. The purpose of this paper is to decide, based on the analysis of presented issue, how important is content marketing strategy to the customers at era of fourth industrial revolution. Presented paper consists of four parts, the first part of paper focuses on theoretical aspects of content marketing. The second part focuses on methods of data collection that are needed to perform analysis and it is also the base for the fourth part of paper. The third part of paper focuses on the results of analysis, which used Spss program and discussions. In the results and discussion section, we used t-test of the mean values of the two dependent variables. The fourth part consists of conclusion, most appropriate ways and recommendations for development of content strategy in the fourth industrial revolution. The result of this paper is comprehensive overview of thematic exploratory content marketing strategy can be used to influence user interests at the fourth industrial revolution and how important is in communication with customers. It uses methods of statistical analysis, comparative methods and also synthesis and other methods of formal logic.

Keywords: Content Marketing, Customers Communication, Customer Taste, Fourth Industrial Revolution

Busra Arikan
ERCICSTR2210059

Exogenously applied Polyphenols, A New Perspective to Mitigate Abiotic Stress Damage in Crops

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Abstract

Abiotic stress factors such as salinity, drought, and heavy metal pollution limit agricultural production by causing loss of plant growth, product quality and yield. Recent studies in the agricultural field have turned to biosafe and sustainable approaches that will increase tolerance to environmental changes in plants and alleviate stress-induced damage. Plant polyphenols contain many bioactive molecules with chemical diversity that play a role in metabolic processes in plants. It is also known that the synthesis and accumulation of phenolic compounds in plants increase as a stress response. In addition, polyphenols are involved in the defense system with their antioxidant activities and metal chelating properties. Therefore, the use of polyphenols in stress tolerance studies is one of the promising ideas. Hesperidin (HES) and chlorogenic acid (CGA) are dietary polyphenols synthesized in plants via the phenylpropanoid pathway. They have been the subject of many studies with their antimicrobial, antiviral and antioxidant properties. However, previous studies have generally been limited to animal tissues and health-promoting effects. This study aimed to examine the effects of exogenous HES and CGA applications on plant growth, photosynthesis and antioxidant system in maize plants under arsenic (AS) stress. Our results show that phenolic applications reduced AS stress-induced ROS accumulation and lipid peroxidation in *Zea mays* leaves. Again, HES and CGA treatments positively affected plant growth under stress and non-stress conditions. While AS stress caused the suppression of the antioxidant system in maize leaves, it was observed that exogenously applied phenolics increased the antioxidant enzyme activities of SOD, POX and GST. Furthermore, HES and CGA attenuated stress-induced damage on photosynthesis-related parameters. As a result, the

use of natural phenolic compounds to increase plant tolerance to abiotic stresses has the potential to improve agricultural production.

Keywords: Antioxidant system, Arsenic Toxicity, Chlorogenic Acid, Hesperidin, Zea mays

Sukran Yildiz
ERCICSTR2210060

Investigation of Haploid Plant Production by Another Culture in Different Bean Genotypes

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Abstract

The problems caused by the conditions that prevent the equal distribution of agricultural products cause unbalanced nutrition and hunger in many countries globally. Therefore, in order to cope with these problems, it becomes a necessity to increase plant production in agriculture. Edible legumes, including beans, have had an important place in human nutrition for many years. Although selfing is possible in the bean plant, it takes a long time to reach homozygosity. It is known that classical breeding studies require high labour power and inbreeding for pure line production takes a long time, such as 7-9 years. In order to contribute to the reduction of the time spent for inbreeding and backcrossing methods used in breeding studies, haploidization studies were conducted with anthers of 12 different bean genotypes. Donor plants were grown under greenhouse conditions by using the seeds. The stages in which the microspore cells are mononucleated were determined to identify the samples' appropriate flower bud development stages. In culture, 48 different combinations of MS and B5 media including different concentrations and combinations of 2,4-D and Kinetin, were tested. Embryogenic callus, embryo development, and plant development stages of anther cultures were investigated statistically and microscopically. The best callus induction from antjers was obtained with B5 medium containing 2, 4-D (0.5 mg L^{-1}) and Kinetin (2.5 mg L^{-1}). It was observed that embryos did not progress beyond the globular stage. The findings here given are the first results of these genotypes, to the best of our knowledge.

Keywords: Anther Culture, Haploid plant, Legumes

Elissa Mollakuqe
ERCICSTR2210062

Cyber Security in the Global Information World Technology

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Abstract

Storage of information and individual privacy have become among the preoccupying issues for society nowadays. In this regard, given the importance of information and the protection of personal data, Cyber Security plays a powerful role not only in the field of information technology, but also for the security of society. Cyber security includes the techniques used to protect the integrity of networks, software, and access from unauthorized access. It refers to the body of technologies, processes and can also be referred to as information technology security. In terms of information technology, security includes cyber security and physical security, both of which are used by enterprises to protect against unauthorized access to the information center data center and other computerized systems. The paper addresses cyber security through the prism of information technology (measures and tools for creating cyber security) and the aspect of legislative and institutional measures to prevent and combat cybercrime. The purpose of this paper is to emphasize the importance of cyber security in an environment and the virtual world in which we live. The paper uses methods of analysis and synthesis, comparative methods, as well as empirical meta.

Keywords: Cyber Security, Cyberspace cyber terrorism, Information security

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Abdelamjeed Adam Lagum
ERCICSTR2211051

Phosphorus Removal and Recovery from Industrial Wastewater via Innovative Electrokinetic System Enhanced with Calcium Carbonate Addition

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Abstract

Industrial wastewater effluents are characterized by a high level of phosphorus (P) content. Phosphorus is considered as a contaminant and leads to eutrophication of surface waters, and therefore, industrial wastewater must be treated before discharging the effluents into receiving water bodies to minimize potential environmental damages. However, from a different perspective, phosphorus is a nonrenewable resource with a specific reserve on the ground. Therefore, phosphorus must not only be removed during wastewater treating processes, but it needs also to be recovered as an additional P source. To achieve this, an innovative electrokinetic system packed with calcium carbonate was developed to remove and recover phosphorus from wastewater. Two control systems: one implementing conventional/chemical coagulation using aluminum sulphate and one implementing electrochemical coagulation using sacrificial aluminum anodes were side by side running to achieve competitive conditions. All lab-scale systems were supplied with a synthetic solution of wastewater containing phosphorus concentrations of about 40 mg PO_4-P/L. Under optimal conditions (CaCO3 = 25 mg\L; pH= 7.5; current= 0.05A; and current density= 0.51 mA/cm2 at 5'ON/25'OFF operation mode) in a batch electrokinetic treatment system, the removal efficiency of phosphate (as PO_4-P) was almost 100%. The new electrokinetic system recovers approximately 80% of P (~32 mg/L) from industrial wastewater in 48 h treatment time at a low current density of 0.51 mA/cm2. It was found that the application of current density and calcium carbonate significantly enhanced phosphate removal due to simultaneous electrocoagulation, electrodeposition, and chemical precipitation processes. A rough energy cost estimation based on semi-quantitative analysis showed the potential to greatly reduce operating costs in addition to the reduction in capital costs using such a hybrid system.

Keywords: Innovative Electrokinetic System, Electrochemical Treatment, Calcium Carbonate Addition, Next-Generation Wastewater Treatment Technologies, Phosphorus Removal, Phosphorus Recovery

Hadi Nabipour Afrouzi
ERCICSTR2211052

Simulation of Partial Discharge Phenomenon Under Various Applied Voltage Amplitude

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Abstract

Partial Discharge (PD) phenomenon causes insulation degradation, which if left unattended, may trigger electrical breakdown due to repetition of PD events. PD modeling is crucial as to develop PD measuring and detection system to assess the condition of the insulation system. A Finite Element Solver program is being used in this project to simulate the Finite Element Analysis (FEA) model. Through the modeling process, electric field distribution in a cavity and a dielectric material can be observed, which influences the PD characteristics under high applied voltage. PD phenomenon is further understood by implementing parameters such as free electron supply, inception field, and extinction field using MATLAB with Livelink and simulated through three different voltage steps namely 10kV, 14kV and 18kV.

Keywords: Partial discharge, High voltage, Insulators, Breakdown, Modeling

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Danah Alabdulmohsin
ERCICSTR2211053

Artificial Intelligence in Enterprise Information Systems: A review

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Abstract

Due to the fast growth of organizational data as well as the emergence of new technologies such as artificial intelligence (AI), organizations tend to utilize these new technologies in their enterprise information systems (EIS) either to overcome the issues they struggle with or to enhance their functions. The aim of this paper is to review the potential role of AI technologies in EIS, namely: ERP, CRM, SCM, KM, and HRM systems. The paper provided the definitions of these systems as well as the definitions of AI technologies that have been used in EIS. In addition, the paper discussed the challenges that organizations might face while integrating AI with their information systems and explained why some organizations fail in achieving successful implementations of the integration.

Nabarun Ghosh
ERCICSTR2209051

Nanotechnology for Remediation of Airborne Pathogen and a Novel Mask to Combat Covid

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Abstract

Air pollution is any particle or gas suspended in the air in high enough concentrations to directly or indirectly have a negative impact on living organisms and on an ecosystem, as a whole. The aerosolized solid, liquid, or mix-phased particles in the air are commonly referred to as Particulate Matter or PM and usually note the average particle size due to various health impacts. Spread of COVID-19 occurs via airborne particles and droplets. People who are infected with COVID can release particles and droplets of respiratory fluids that contain the SARS CoV-2 virus into the air when they exhale (e.g., quiet breathing, speaking, singing, exercise, coughing, sneezing). The droplets or aerosol particles vary across a wide range of sizes – from visible to microscopic. Once infectious droplets and particles are exhaled, they move outward from the person (the source). These droplets carry the virus and transmit infection. Indoors, the very fine droplets and particles will continue to spread through the air in the room or space and can accumulate (EPA, 2021). In the recent years with the unprecedented situation of COVID-19 pandemic, it became a necessity that the scientific world comes forward with an objective of developing more equipment for air purification with novel technology to combat with the airborne pathogen, aeroallergen and viruses. The average human breathes 11,000 liters of air daily. We have to make sure that each liters of air is pollutant-free such as PMs, CO, NOx, SOx and O3 and especially for athletes that breathe more than 20,000 liters of air per day and the breathings are deeper and can reach deeper regions inside their lungs. Air quality is an important factor for overall health. We report the development of a novel face mask by the AFL Industries in the UK, which was assessed for the safety measures, and further improvement by the West Texas A&M University. The AFL-Mask can be charged anywhere just like a cell phone with the supplied charger. It also provides the adapter to charge anywhere in the world. Once fully charged it can be used for 6-8 hours continuously. This mask functions in an advanced way to combat all forms of airborne pathogens including the bacteria, viruses, mold spores and harmful VOC (Volatile Organic Compounds) present in the air.

Lukasz Chodyła
ERCICSTR2212051

Gnu/Linux Remote Application Launcher Tool Enabling Screen Space Manageability

Lukasz Chodyła

	Platforma Biznesu, Szczecin, Poland **Abstract** Self-service devices in the form of multimedia totems and kiosk stands have been filling public spaces since the rise of LCDs and touch screen accessibility. These include ticket vending machines, ordering panels, and interactive maps. In addition, there are devices that support communication, customer service, or working time recording at the corporate level. In each of these cases, a desirable feature is the ability to provide more than one service with the possibility to remotely control each of them separately. Current solutions mainly focus on single process-based full-screen application systems. This implies the need to integrate all functionalities in one application and the cost of a dedicated implementation, even when a solution that provides the required functional part already exists on the market. The aim of the work was to develop a remotely managed platform that launches processes with a graphical layer, tracks events, and enables windows positioning according to a predefined layout. The proposed alternative is to break down the served content into applications launched by a system supervising the processes and communicating with the window manager. The task of such a supervisor, in addition to executing the application, is to track events occurring at the visual layer, identify the source process, and, after matching the window with the appropriate application, modify its attributes according to user-defined rules. Due to the multiplicity of approaches, availability of source codes, and ease of modification, the platform was based on GNU/Linux operating system. Future work includes attempts to map windows from virtual machines running applications for other systems. An implementation of an equivalent for Android systems is also under consideration.
Roman Siedlikowski **ERCICSTR2212052**	**A Scalable Content Presentation Platform for Digital Signage System Owners Roman** Roman Siedlikowski Platforma Biznesu, Szczecin, Poland **Abstract** The digital signage industry, defined as content serving with the use of various multimedia means, has gained popularity as one of the main methods of reaching the audience with information or advertisement. Getting feedback or providing a complete service using multimedia kiosks and touch screens is also becoming a standard. However, the content presented by these devices needs to be updated, which concerns not only the information itself but also the presentation method. Existing systems offer singular applications that implement the required functions, often using screen partitioning into sections. The difficulty with this approach is the limited ability to outsource the development of further functionality by maintaining a single application or forcing integration with a designated application programming interface (API). The aim of the project is to give digital signage system owners a platform that will allow them to outsource application development for their devices regardless of the technology being used (no requirements regarding the programming language) and without forcing the use of a specific programming interface. The only requirements to be imposed by the system owner on hired programmers should be functionality and target operating system. The proposed solution is a GNU/Linux window server screen virtualization with the possibility of running full-screen applications limited to a selected area. In the course of the work, tests have been carried out on a prototype platform, including custom applications as well as popular applications already available on the market. Future plans include the development of a comprehensive platform for installing, updating, and maintaining large-scale network applications.
Rose Chinly Mae	**High-Throughput Sequencing Reveals the Dominance of Shewanella Species in the Intestinal Microbiota of Barbour's Seahorses (Hippocampus Barbouri)**

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Ortega **ERCICSTR2212053**	Rose Chinly Mae H. Ortega **Abstract** In this study, the taxonomic classification of intestinal microbiota from healthy Barbour's seahorses (Hippocampus barbouri) was determined as it plays an important role in host nutrition and immunity. Genomic DNA was extracted from the intestinal mucus samples of eleven Barbour's seahorses, which were subjected to high-throughput sequencing of bacterial 16S rRNA genes targeting V1-V3 regions. The results revealed that the most abundant operational taxonomic units (OTUs) were affiliated to the genus Shewanella. Our findings may provide baseline data for further studies in order to explore the potential implications of intestinal microbiota to seahorses in terms of health status, development, growth, and survival. **Keywords**: Phylogenetic Analysis, Shewanella Species, Seahorses
Mosab Alhazmi **ERCICSTR2212057**	**Service Quality and its Effect on Customer Satisfaction a Case Study in Hospitality Sector** Mosab Alhazmi Engineering Management, Islamic University of Medina (IUM), Saudi Arabia **Abstract** TQM is one of the leading quality management philosophies that have been adopted by some Saudi firms and many others are moving toward implementing this philosophy to improve service quality and increased customer satisfaction. Through the implementation of quality improvement initiatives that are aimed to improve process efficiencies, and reduce waste and waiting time, companies throughout the world have reported that they had received positive feedback from their customers which in turn leads to increased customer satisfaction. However, very limited studies have been reported to have been carried out in the Saudi Arabian context nor have research confirmed that the findings elsewhere are also applicable in this country. It is important therefore to ascertain whether the same holds true here or whether cultural differences may play a moderating role in this situation. The aim of this research is to carry out a study on a major Saudi organization notably Taiba Investment in one of their hotels in terms of the extent to which such improvements company would get useful feedback to gauge the effectiveness of quality management practices that they have put in place and to what extent they have affected the levels of satisfaction of the customer. A literature review is carried out to determine the theory and theoretical framework upon which this research will be carried out. The research methodology will be based upon a questionnaire as the main instrument for gathering primary data. The customer here is defined as the internal customer (within the organization) and external customers. A questionnaire will be designed and validated by industry experts. A pilot study will be carried out and improvements will be made prior to carrying out the actual survey. The results will be analyzed for statistical significance and conclusions will be drawn after the analysis has been completed.
Sarah Otun **ERCICSTR2212058**	**The Effect of Washing, Blanching, and Drying on the Microbiological and Nutritional Properties of South African Leafy Vegetables** Sarah Otun Protein Structure Function Research Unit, Department of Molecular and Cell Biology, University of the Witwatersrand, South Africa **Abstract** Cowpea (Vigna unguiculate) and moringa (Moringa oleifera) are nutritious and medicinal

leafy vegetables but could also harbour dangerous microbial contaminants. This observation turned into aimed at figuring out the impact of washing, blanching, and drying processing techniques on the microbiology, nutrient profile and shelf life of these vegetables to supply nutritious, tasty, safe and durable vegetable products. Leafy vegetable samples were amassed at each level of processing and were analysed for total microbial and nutritional content material. Microbial analysis showed the presence, particularly on cowpea leaves, yeasts and microorganism which includes Pseudomonas, Klebsiella, Staphylococci, Streptococci, and Enterobacter enteropathogens including Salmonella spp., Shigella dysenteries, and E coli. The best processing approach which reduced microbial load to beneath SABS standards even as retaining nutritional high-quality become the washing of the leaves twice with tap water followed via steam tunnel blanching at 94oC for 12 mins. Oven drying the leaves at 60oC gave satisfactory and extended shelf lifestyles results. Proximate analysis evaluation of the two leafy vegetables showed that on common moringa leaves contained extra ash (2.37 vs 1.1 g), protein (6,9 vs 3,6 g), fats (0,41 vs 0.2 g) and energy (305,1 vs 70 KJ) but much less dietary fibre (0,9 vs 7,5 g) than cowpea leaves. No widespread variations have been noted in those values following washing and steam blanching. These effects indicate that washing of those leaves is effective as to reducing microbial load and keeping proximate values in the quick time period (up to 4 days) however that oven drying is powerful for longer-term storage.

Mohammadjavad Ranjbaran
ERCICSTR2212059

Investigation of Fracture Prevention Effects of Composite Patches Repair on Cracked Al-Plates: Experimental and Numerical Study

Mohammadjavad Ranjbaran
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Abstract

Today's cutting-edge world of science and technology calls for composite materials to be widely employed in numerous industries, including marine, aeronautical and automotive due to their excellent mechanical, chemical and thermal characteristics. In various engineering applications composite materials are cost-effective, reliable, life saver and efficient. By reducing the strength-to-weight ratio by significant amounts, composite materials have revolutionized the manufacturing process of aircrafts. In the present research, 50 rectangular cracked aluminium alloys 7075 specimens with central crack were repaired by glass-epoxy composite patches with 0,90 and-45, +45 fibres orientations. Then, the specimens were subjected to uniaxial tensile loading test experimentally using the 600KN Santam testing machine. Next, the force-displacement curve for each repaired sample was monitored and plotted by the testing machine user's software. After that, Abaqus as a finite element software was employed to numerically simulate and perform the tensile test with XFEM method on developed three-dimensional models. Lastly, the experimental and numerical results were validated and compared precisely. It was concluded that XFEM as an effective technique is capable of predicting crack propagation with a maximum 0.0266 error percentage. Moreover, specimens repaired by glass-epoxy with 0,90 fibres orientation have the optimum performance while the ones whose fibres orientation is -45, +45 extended more before failure.

Keywords: Composite Patch Repair, Crack Propagation, Extended Finite Element Method, Cracked Aluminum Alloy 7075 Plate, Fracture Prevention

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Phawini Pokrathok
ERCICSTR2212061

Development of a Topical Gel Containing a Dipeptidyl Peptidase-4 Inhibitor for Wound Healing Applications

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Abstract

Chronic wounds are challenging for healthcare because they are difficult to treat and cannot heal by themselves. Active compounds that can accelerate wound healing are, therefore, necessary. Dipeptidyl peptidase (DPP)-4 inhibitors are antihyperglycemic drugs widely used in patients with type 2 diabetes that not only maintain the homeostasis of blood sugar levels but have also been shown to promote chronic wound healing. In this study, we formulated a topical gel containing, sitagliptin, a commonly used DPP-4 inhibitor drug to treat diabetes, using Carbopol® 940 as a base due to its high viscosity and biocompatibility. The characteristics of the sitagliptin gel, including its physical appearance, viscoelastic properties, swelling and degradation, and stability, were investigated. The gel appeared to be transparent with a uniform distribution of drug molecules and was stable at 4 °C for more than 1 month. Moreover, the gel was shown to exhibit shear thinning pseudoplastic behavior, which is desirable for topical gels. The gel could absorb up to 250% of liquid within 2 days but later degraded in aqueous solution following zeroth-order kinetics. In the in vitro release study, the cumulative release data were best fitted with the first order kinetic model, in which the release rate depended on the concentration. To further demonstrate the use of the DPP-4 inhibitor gel, the gel was applied directly onto subcutaneous wounds on experimental pigs. The topical gel was shown to exhibit the desired spread ability without creating any inflammation around the wound area.

Keywords: Chronic Wounds, DPP-4 Inhibitor, Sitagliptin, Carbopol® 940, Kinetic Model

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