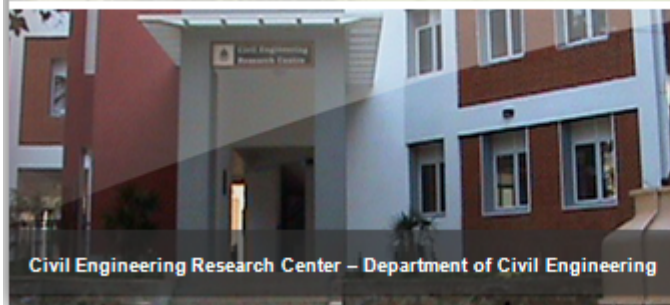




Proceedings of Civil Engineering Research Symposium 2015 (CERS 2015)



Civil Engineering Research Center – Department of Civil Engineering



UNESCO Madanjeet Singh Center for South Asia Water Management – Department of CIVIL Engineering

22nd October 2015

Department of Civil Engineering
University of Moratuwa

CIVIL ENGINEERING RESEARCH SYMPOSIUM-2015

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Message from Head/ Department of Civil Engineering

The Civil Engineering Research Symposium (CERS) was first held in 2011 as a forum for disseminating findings of UG and PG research carried out in the department for the industry and for mutual exchange of views among engineers, researchers and academics. Since then it has become an annual event of the department.

The role of a university is not only disseminating knowledge but also creating new knowledge through research at the highest possible level. Our research findings should be useful to industry and society; and also to develop the country and uplift the standard of living of people. Around the world, countries have recognised that universities, especially research universities, are the key to the knowledge economy of the 21st century.

Our staff members are very active in applied research in a wide spectrum of Civil Engineering specialities such as Building and Structural Engineering, Construction Engineering and Management, Environmental Engineering, Geotechnical Engineering, Hydraulic and Water Resources Engineering and Transportation Engineering. As a department as well as individual staff members, we have established collaborative research links with the industry, local research organizations and foreign universities. In 2013, a partnership agreement was signed between University of Moratuwa and Holcim (Lanka) Ltd to support the Department of Civil Engineering through collaborative research especially in the areas of cement and concrete. By the end of this year, a similar agreement will be signed between UoM and Ceylon Steel Corporation Ltd to sponsor collaborative research and support the activities of the Civil Engineering Society.

Final year undergraduate research projects have played an important role in establishing the research culture in the department. They were initiated as group research projects, but from 2013, individual research projects were introduced to give more exposure for students to carry out an independent study.

The proceedings of this year's Symposium contain 17 research papers mainly based on UG research work. All the papers have gone through a double-blind peer review process to ensure the quality of publications.

A lot of people have helped and worked hard to produce a successful technical programme and symposium proceedings for CERS 2015. I would like to thank all the authors for submitting their papers, the keynote speaker Emeritus Prof. B L Tennakoon, the Chairperson and committee members of the Symposium committee, and the reviewers who carried out the most difficult task of carefully evaluating the submitted papers. I would also like to thank Holcim (Lanka) Ltd for their financial support.

Prof. S. M. A. Nanayakkara
Head/Department of Civil Engineering

Message from Dean, Faculty of Engineering

I wish to congratulate the Department of Civil Engineering of the University of Moratuwa for organising the "Civil Engineering Research Symposium 2015 (CERS 2015)" scheduled in October 2015, at the Department of Civil Engineering, Faculty of Engineering, University of Moratuwa, Sri Lanka. I am pleased to note that the tradition of holding an annual research symposium by the Department is continuing since 2011.

CERS 2015 forms a platform to bring together the alumni, the staff and the undergraduate students of the Department, for sharing their views on the status of the Civil Engineering Research focused on Industry. Given the vital contribution made by the field of civil engineering towards the development of the country, this symposium is of particular importance to civil engineers in the industry and undergraduates alike.

The Department has taken many steps in recent years to enhance its teaching profile, update the delivery methods, and improve its research profile, and has been both the pioneer and leader in postgraduate education in engineering at the University of Moratuwa. In addition, the staff provide advice and expertise to the state sector on technological and policy matters while engaged in research and consultancy services for the civil engineering industry. The undergraduates receive good exposure to the industry throughout. It is my wish that this Symposium, while disseminating new knowledge, would further the desire for conducting applied research in the field of civil engineering.

I wish to convey my thanks to Prof. Anura Nanayakkara, Head, Department of Civil Engineering, Prof. Athula Kulathilaka, Chairman of the Symposium, Dr. (Mrs.) Premini Hettiarachchi, Editor of the Symposium, and the Organising Committee, for organising the Civil Engineering Research Symposium 2015.

Prof. U. G. A. Puswewala
Dean, Faculty of Engineering
16 October 2015.

Message from the Vice-Chancellor

Civil Engineering Research Symposium (CERS) has now become an important annual event of the Department of Civil Engineering. I was very pleased to note the enthusiasm of the Department to organize this focused research symposium demonstrating its individual contribution for university research. The Department of Civil Engineering is therefore a trend setter for the other departments to drive research and to hold focused research symposia.

One of the goals that the University strives to achieve is to have a thriving and sustainable research and innovation culture in our march towards a world class university. To this end, attempts are made to attract funding from international offers, private sector funding leveraging 300% tax concession for research investment, international collaborations and funding from other local institutions in addition to enhanced Senate Research Grants this year. This is a great opportunity for Civil Engineering Department to significantly contribute for development of alternative/new materials, new construction technologies, new building components to support rapid infrastructure development of our country which is a pre-requisite for our march towards a middle income nation.

It is my hope that this Symposium will not only disseminate Civil Engineering research findings but also create further opportunities to identify new directions, obtain ideas for more development oriented research and attract further research funding.

While expressing my appreciation to the Head/Department of Civil Engineering and the organizing committee for dedicatedly organizing this Symposium, congratulating the authors of the papers for their achievements, I wish Civil Engineering Research Symposium 2015 a great success.

Prof. Ananda Jayawardane
Vice-Chancellor

Acknowledgement

This is the Fourth Civil Engineering Research Symposium (CERS) following the successful symposia in 2011, 2012 and 2014. This year the papers are based on selected undergraduate research projects of 'Batch 10'. This is the second year in which the final year students are carrying out projects on an individual basis in contrast to the previous practice of group projects. This brings out the hidden capabilities of all students as they have to complete the project successfully. The research symposium provides an opportunity to present their research findings in written and oral form to a general audience. This will help them to enhance their research and presentation skills. With the four page paper format they will be trained to present their research findings with clarity in a concise manner.

The audience for the symposium is composed mainly of academic staff and final year students who are at present engaged in their research projects. This is an opportunity for the students to realise for themselves, the standards they should strive to achieve in their own projects.

The keynote speaker for the event is Emeritus Professor B L Tennekoon. The immense contribution he has made to enhance the quality of education and research at the University of Moratuwa is very well known. At this symposium present day undergraduates will be provided an opportunity to learn from his vast experience. The organising committee express their sincere gratitude to Prof. Tennekoon for accepting our invitation to deliver the keynote lecture.

This symposium is held with the blessings of the Vice Chancellor and the Dean of Faculty of Engineering. The organising committee wish to thank the Vice Chancellor and the Dean, Faculty of Engineering for their wholehearted support. A big Thank you is due to the Head of the Civil Engineering Department who motivated us to do our best with his encouragement.

Thank you to the authors of the papers without whom this event would not be a reality. A special word of thanks to the editorial and review panels for ensuring that quality is maintained. The assistance of Ms Pradeepa Peiris in formatting the conference proceedings to perfection and 'Universal Printers' for printing them at short notice, is much appreciated.

The organisers also wish to thank all those who assisted in numerous ways.

We extend our heartfelt gratitude to the sponsors of this event Holcim Cement for their continued support and generous contribution.

On behalf of the Organising Committee

Prof. Athula Kulathilka (Conference Chair)

Civil Engineering Research Symposium 2015

October 22, 2015

Editor-in-Chief

Dr.(Mrs.) M. T. P. Hettiarachchi

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(Head, Department of Civil Engineering)

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