

Dear Reader,

We are pleased to introduce Dr. Sekhar Chandra Dutta, our Guest Editor for this edition. Dr Dutta is a Professor in the Department of Civil Engineering Indian Institute of Technology (ISM) Dhanbad. A Fulbright-Nehru Senior Research Fellow at the University of California Davis, his broad areas of research are Structural Dynamics, Earthquake Engineering, Soil-Structure Interaction and more. He has several accolades including being the Founder Head of School of Infrastructure, Indian Institute of Technology Bhubaneswar. Recognised as a Resource Person under National Programme for Capacity Building of Engineers in Earthquake Risk Management by Government of India, he has been disseminating knowledge related to earthquake-resistant design since 2006. Recently, he has been selected as Fellow of Institution of Civil Engineers (UK). He brings to our readers some interesting research in seismic behavior of concrete structures through this edition of the ICJ.

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Dear Colleagues,



It is a memorable moment for me to write this Editorial for the themed issue on seismic behavior of concrete structures of the ICJ. The entire Indian subcontinent is regularly visited by small to medium magnitude earthquakes since 1988.

Each time such event brings tremendous outcry causing huge loss of properties and lives. Many developing countries including India and the entire subcontinent cannot afford to use steel frame because of its higher cost. Hence, the reinforced concrete structure poses the only solution for the construction industry. In fact, the neighboring country China has created many structural wonders using reinforced concrete elements. Thus, the issue of survival of concrete structures in the event of earthquake becomes very critical one for safeguarding the fate of human civilization. This themed issue of the ICJ is dedicated as a small effort to alleviate such problem.

Further, the cost of a structure is a major deciding parameter and sometimes becomes a bottleneck to take up a project in seismically prone zone. So, dual design philosophy, more systematic form of which is known as performance based design is coined. According to this philosophy, the structures are designed to behave in an elastic manner for moderate earthquake expected at that place. This implies that in the event of occurrence of such an earthquake which may be experienced several times in the life period of buildings, it should not be damaged and can be occupied and used immediately the earthquake is over. However, for severe earthquakes, controlled damage may be allowed as its return period is long and to afford the cost of performing elastically under such event will be significantly high. Implementation of such philosophy requires more enlightenment which was a facet of this particular themed issue.

The present issue of the ICJ opens with a paper addressing basic question on how the dynamic modulus of concrete will

be calculated. This is a very vital point which is required for accurate prediction of natural period of a structural system. This fundamental natural period is traditionally the most important input parameter for seismic design of structure. In this context, this paper forms an interesting read.

A recent approach to reduce the effect of seismic vibration is to increase damping by adding additional damper to the structural system. Second paper addressing this issue is expected to develop an outlook about the same and may be helpful to pave the way of reducing the seismic vibration.

In the past few earthquakes occurred in India, building with soft ground story has exhibited catastrophic failure. In fact, a number of such failures occurred during the Gujarat earthquake. The third paper attempts to throw light on this aspect. It demonstrates how bare reinforced concrete frames can be strengthened with steel braces.

The concept of performance based design is introduced in Indian seismic code (IS 1893-2016) through introduction of response reduction factor. The next paper addresses about the assessment of R for elevated water tanks.

The last two papers also focus on two important aspects of seismic behavior namely, effect of shape of columns and the aspect of getting fragility curve.

Thus, the present issue, overall, gives a picture of various emerging areas of research in the field of seismic behavior of concrete structure including elastic as well as post elastic range response.

It is expected that such collection of papers will contribute to the domain of knowledge of structural engineering professionals in a fruitful manner.

Dr. Sekhar Chandra Dutta
Guest Editor, ICJ.