

Editorial

Modelling of Structures under Seismic, Impact, and Shock Vibrations

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The special issue is to address the state of knowledge in the areas of seismic behavior of structures; response of structures under blast, shock, and impact loads; material behavior under blast; impact and explosion tests; structural mechanism and damage evolution; protection concepts and design; and linear/nonlinear analytical/numerical modelling of structures and simulation. This issue will benefit structural engineers for modelling structural analysis and design for extreme loads (seismic, blast, and impact), in which the structure primarily behaves nonlinearly and inelastically. The investigators have been invited to contribute original research articles as well as review articles that have been stimulating the continuing efforts to understand the modelling of structures under the extreme loadings.

The modelling of materials and structural behavior under dynamic loading, including blast/shock-induced vibration, impact loading, and seismic actions, is a very challenging topic with several open questions that need to be addressed in order to obtain safer structures. The main reason to promote the present special issue was to promote a platform to share the recent advances that may be beneficial to structural engineers, who are facing challenges, when modelling structures for analysis and design for extreme loads.

64 papers have been submitted, from which a total of 25 papers have been finally selected to integrate the present issue, which shows the interest and importance of the special issue topic.

There are many severe conditions under which the vibration occurs under short duration impact loads within milliseconds of time history response such as falling-weight impact loading and rock fall on structures. The impact with very high response such as blast and shock vibration impact on structures of various types within microseconds have been added. Eight papers are focused on shock and blast in structures, and the topics covered are related with the response of building structural elements, as well as the effects in special infrastructures.

Eleven papers were submitted related to pure dynamic and vibration modelling strategies.

Since the last century, many developments have been made in understanding the seismic demand on structures due to earthquake-induced ground motions and structure response under dynamically varying loads. However, observations from the recent past earthquakes have demonstrated that structures designed to modern codes of practice and guidelines have not performed up to the expectations in reducing losses due to earthquakes. Furthermore, the recent earthquakes have demonstrated that the vulnerability of deficient; that is, noncomplaint, structures is higher than the previously known. All these are pointing to the growing interest in tools for modelling of structures under earthquake loading, to accurately account for the possible damage mechanisms and their implication on the structure response under earthquakes of

varying intensity, for example, frequent earthquakes, rare earthquakes, and very rare earthquake. With the advancement of experimental database, it is possible to test, validate, and calibrate tools for structure modelling and analysis, which can be in turn used both in research and practice. Six papers are focused in the study of earthquake impact in structures and infrastructures. In fact, the topics in several cases cross the boundaries mixing the advanced dynamic methods to study the seismic effects on structures or combining different hydrodynamic loads with the effects of earthquakes, and only with the proper advanced numerical strategies will be possible to have an accurate assessment of the structural behaviour.

The editorial team is sure that the papers reflect significant researches and developments the different topics addressed. We hope that readers will find all articles of the special issue useful and exciting and that the articles will stimulate further research activities in the area of damage assessment.

Conflicts of Interest

The guest editors have no conflicts of interest regarding the publication of this special issue.

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