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# Editorial: Seismic vulnerability assessment of structural and non-structural components in industrial plants

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Editorial on the Research Topic
Seismic vulnerability assessment of structural and non-structural components in industrial plants

Recent seismic events worldwide have underscored the necessity for seismic analysis and design approaches that not only guarantee the safety of human life during infrequent earthquakes but also effectively manage the potential damage or performance of structures within acceptable seismic risk thresholds. The seismic performance of industrial facilities, encompassing storage tanks, silos, pipelines, racks, and non-structural elements, holds immense significance. This importance extends beyond the economic value of these structures and their contents to encompass the environmental and public health implications. Moreover, these structures often play a critical role in the operation of emergency services following seismic events. Any disruption in the supply of oil products or water resources could significantly impede the functionality of essential services like hospitals and fire stations, which rely on these resources.

This Research Topic primarily focuses on recent advancements in analytical methods, modeling approaches, design solutions, and construction details related to the assessment of seismic vulnerability and risk in both structural and non-structural components within industrial facilities. The six Submitted Papers were able to highlight significant progress in experimental testing and validation of these components. This encompasses discussions on test methodologies, emerging technologies, the interpretation of experimental findings, and their practical applications within the field of earthquake engineering. The central goal of this Research Topic is to enhance our understanding of the seismic vulnerability and risk associated with industrial plants. By doing so, it aims to provide fresh insights into how to enhance the seismic design of new industrial facilities and upgrade the seismic resilience of existing ones. The first paper "*A Screening Methodology for the Identification of Critical Units in Major-Hazard Facilities Under Seismic Loading*" proposed a screening methodology for rapid identification of the most critical components of a major-hazard plant under seismic loading. It is based on a closed-form assessment of the probability of damage for all components, derived by using analytical representations of the seismic hazard curve and the fragility functions of the equipment involved.

The second paper "*Effectiveness of load-level isolation system for pallet racking systems*" aims to investigate an innovative seismic mitigation solution for storage systems, i.e., the Load-Level Isolation System (LLIS), which consists in placing isolation devices on the load levels, at the base of the goods (pallets). This solution falls within the Tuned Mass Damper (TMD) techniques, widely used in civil engineering, and takes advantage of the high payload of storage systems compared to their self-weight.

The third paper "*Simplified out-of-plane seismic behavior assessment of non-structural rocking walls*" provides a simplified tool for preliminary seismic assessment of the out-of-plane behavior of non-structural walls, such as unreinforced masonry partition walls, based on non-linear time-history analyses. The studies are performed using equivalent single-degree-of-freedom systems and trilinear hysteretic models. The out-of-plane stability is investigated through statistical assessment of computed non-linear displacement demand related to spectrum-compatible ground motions.

The fourth paper "*Seismic performance of Chilean concentrically braced frame industrial structures: effects of recent code modifications*" points out the most significant aspects of models that have been developed to assess the performance of different industrial structures in Chile. All these structures are based on CBFs, the performance of which is usually controlled by the bracing system.

The fifth research is a review titled "*Design code review on seismic demand and base detailing criteria: an application to wine tanks in Marlborough*" focuses on wine tanks that are the lifelines and critical structures of wineries, one of the most strategic industries in New Zealand and many other wine-producing countries. He failure of wine tanks leads to significant economic losses as they are used for the fermentation and storage of wine. Wine tanks are sealed, ground-supported liquid storage systems that have a vertical cylindrical shape.

The last paper "*Out-of-plane behavior of innovative infill walls made of autoclaved aereated concrete (AAC) subjected to shake table tests*" investigates the out-of-plane behavior of an innovative AAC infill wall system by means of shake table tests. The wall system was made of low-density AAC units with innovative joints made from polyurethane resin and steel plates for connection to a structural frame. Shake table tests were carried out using artificial accelerograms based on ICBO-AC156, which can reproduce a wide range of interstory drift demands.

## Author contributions

RN: Writing–original draft.

## Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The author(s) declared that they were an editorial board member of Frontiers, at the time of submission. This had no impact on the peer review process and the final decision.

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