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## **ABSTRACT:**

### **Experimental Investigation of Earthquake-Induced Dynamics in Open Liquid Tanks**

M. Nikolić, J. Radnić, N. Grgić, A. Harapin

The seismic vulnerability of industrial liquid storage tanks presents serious risks to public safety, the environment, and economic stability across sectors including petroleum, chemical processing, and water supply systems. Earthquake-induced failure can lead to severe consequences, including major economic losses, environmental damage, and loss of life. A key phenomenon during seismic events is liquid sloshing, which becomes particularly intense when excitation frequencies match the natural frequencies of the liquid free surface. This resonance generates strong hydrodynamic pressures on tanks that can cause highly nonlinear structural behaviour and potentially lead to tank failure.

This paper presents an experimental study on the seismic response of open liquid storage tanks using a scaled physical model tested on a shaking table. The effects of critical parameters are systematically investigated, including tank wall thickness, liquid fill height, and ground motion characteristics such as excitation type, predominant period, and amplitude. Key conclusions regarding the dynamic behaviour and fluid-structure interaction mechanisms are presented and discussed. The main conclusions improve understanding of fluid-structure interaction during earthquakes and can help develop safer tank design practices.

**KEYWORDS:** liquid storage systems; seismic excitation; free-surface motion; shake table testing; fluid pressures; sloshing; dynamic response.