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Tuned sloshing dampers on steel structures: Model and experience (Conference Paper)

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Abstract

The paper focuses on the possibility of coupling liquid dampers to structural constructions for mitigating their response under the action of dynamic excitations, such as seismic events. The difficulties met in modeling the sloshing of the fluid at the inner of the containers is emphasized, showing their non-linear behaviour. Considerations about possible simplifications are discussed and experimental results are reported from a laboratory campaign for evaluating benefits related to the adoption of liquid mass damping devices. © 2006 Taylor & Francis Group.

Indexed keywords

Engineering controlled terms: Dynamic response; Engineering geology; Hydrodynamics; Seismology; Steel; Steel construction; Steel structures
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Tuned sloshing dampers on steel structures: Model and experience

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ABSTRACT: The paper focuses on the possibility of coupling liquid dampers to structural constructions for mitigating their response under the action of dynamic excitations, such as seismic events. The difficulties met in modeling the sloshing of the fluid at the inner of the containers is emphasized, showing their non-linear behaviour. Considerations about possible simplifications are discussed and experimental results are reported from a laboratory campaign for evaluating benefits related to the adoption of liquid mass damping devices.

1 INTRODUCTION

In tall slender structures, deformation and motion perception due to wind-induced vibration become relevant and may lead to failure of the serviceability limit

response due to the excitation action F_g (Fig. 1). Tuning the natural frequency of liquid sloshing with the natural frequency of structure, results in the optimization of the effectiveness of the damper. Recent growing interest in liquid dampers for application to structures