MAGNETO RHEOLOGICAL DAMPER EQUIPPED MASS DRIVER (MR-MD)

Step by step design know-how for seismically retrofitting a primary structure using controllable secondary mass driver. Best suited for improving the seismically deficient RCC structures

Semi active tuned mass dampers (SATMDs) can be used as an adaptive response control device, effective against the changes that occur in dynamic characteristics of passive TMDs and/or primary structure, changing environmental conditions, changing input excitations etc. This opens the possibilities of utilizing SA-TMDs as seismic retrofitting strategy through the principle of damping addition from secondary to primary structures. The methodology of seismic retrofitting of a primary structure through damping addition using magneto rheological (MR) damper equipped mass driver (MD) is proposed. The MR-MD (Magneto rheological Mass Driver) technology is a damping enhancement-based seismic retrofitting method for reinforced concrete structures. It utilizes a combination of a magneto rheological damper and mass driver device to reduce the impact of seismic activity on damaged reinforced concrete structures.

Features / Highlights

- Seismic retrofitting using SA-MRMD principle
- Secondary structure is the non-linear magneto-rheological (MR) damper equipped mass driver (MD)
- Design charts to aid the selection of suitable market-available MR damper depending on required level of damping
- Step-by-step design methodology to include MR-MD to a primary structure

Technical Details

- Bilinear modelling of MR damper to characterize its non-linearity
- Damping addition using MR damper equipped secondary mass drivers and in turn to the primary structure
- Step-by-step design methodology for damping addition based seismic retrofitting using MR-MD

Applications

- Seismic retrofitting of RCC structures

Figure (a) Full view of primary structure + magnetorheological (MR)-mass driver (MD) system

(b) close up view of MR-MD (c) components of MR-MD

Status of Technology

- Laboratory demonstration of MR-MD based seismic retrofitting on a three storey RCC structure with negligible inherent damping
- Experimental investigations with undertuned, overtuned, and near-optimum tuned conditions of the secondary MR-MD system

Future Plan

- Design improvements of SA MRMD for practical applications

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For further details:
Director, CSIR-Structural Engineering Research Centre, CSIR Campus, Taramani, Chennai - 600 113.
Tel.: 91-44-22549201; director@serc.res.in; http://serc.res.in
https://www.facebook.com/csirserc https://twitter.com/csir_serc