

A NEW TYPE SHOCK ABSORBER AND ITS EFFECTS
ON THE RESPONSE OF THE BRIDGE TO THE EARTHQUAKE^I

Discussion by
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The possibility of improving the resistance of bridge structures to seismic actions by means of dampers was investigated by our Institute during the last years in connection with some research programs sponsored by the Italian Research Council. In particular we studied the same problem discussed by the authors, see, the behaviour of two simple oscillators connected through damping devices. These ones can be of viscous type or also based on plastic energy dissipation. The viscous dampers can be of the conventional viscous oil type as used for instance in the well known Tokyo hanging roof; the elasto-plastic dampers are similar to those described by Skinner, Kelly and Heine in the paper no.370 presented at this Conference.

One of the aims of the research was to investigate the conditions for the best design of the dampers in view of reducing at the most the seismic response of the system.

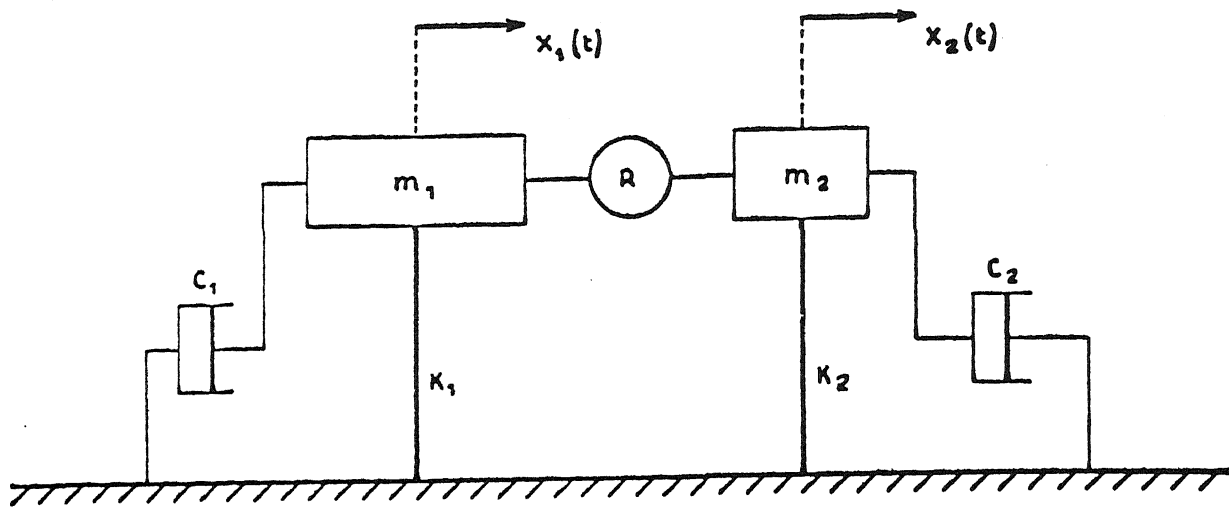
In figure 2 it is possible to see an example of the obtained results (1). There is represented the ratio of the r.m.s. response of the two masses (fig.1) to the response of the mass 1 for a white noise base excitation. On the abscisse we have an adimensionalized value ζ of the damping of the proposed R device. The other parameters are α ratio of the masses and β ratio of the natural frequencies. It is interesting to observe that for a certain range of values of the parameter ζ it is possible to reduce the r.m.s. response of both oscillators or at least of one of them. In any case the connection through the damper is better than the rigid connection.

A comparison between a viscous damper and an elastoplastic one effected by means of a step by step numerical procedure based on El Centro earthquake showed that the responses are reduced qualitatively in a similar way for the two types of damping devices. It is then possible to use elastoplastic dampers instead of the viscous ones. The advantages of the elastoplastic dampers could result in a lower fabrication cost and in no maintenance problem.

1) Ciampi, V., Sull'impiego di organi di smorzamento nelle strutture antisismiche, Giornale del Genio Civile-fasc.12-Dicembre 1969

I Paper no.173 by Kitta, Koderu, Ujiie and Tada

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$\ddot{x}_3(t)$
 Fig. 1

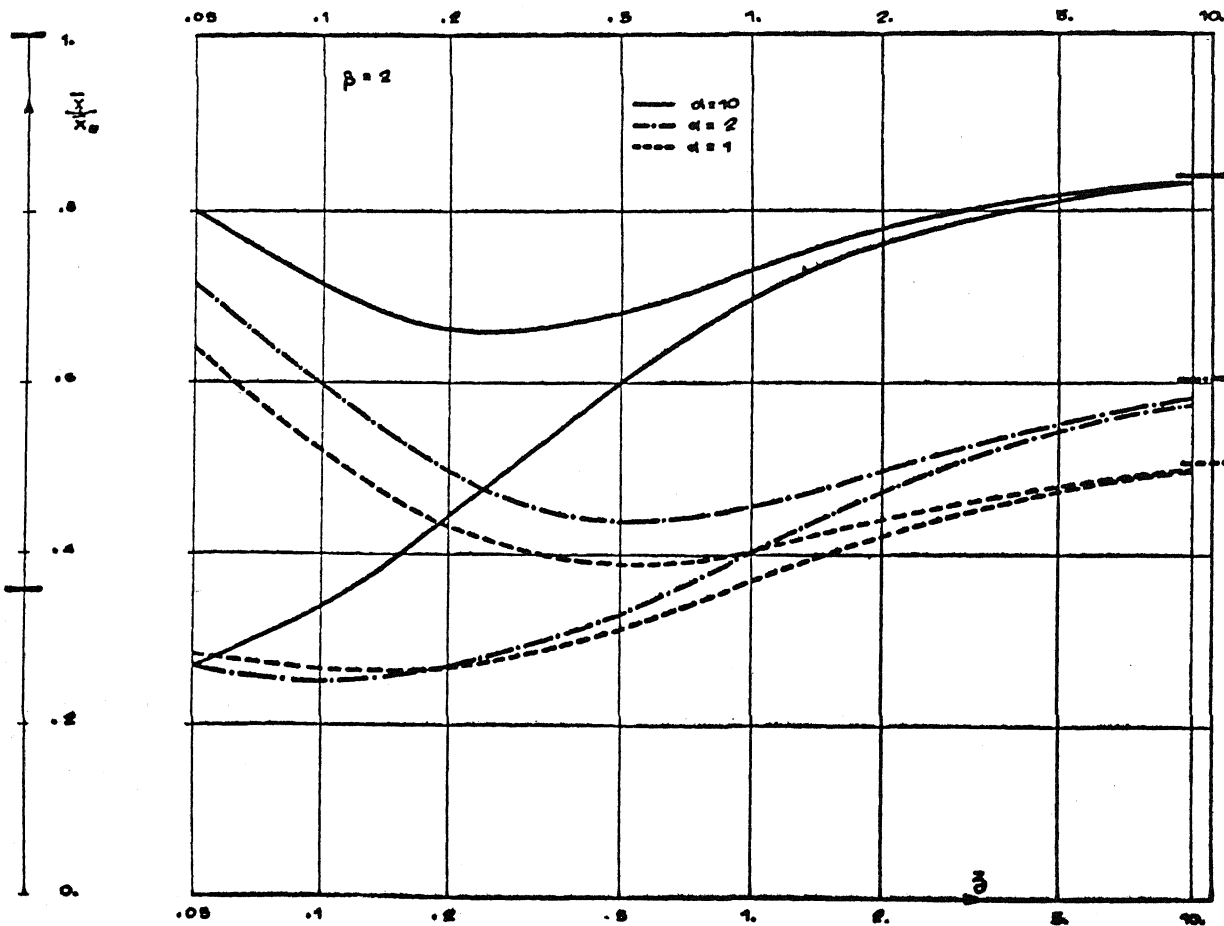


Fig. 2.