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ABSTRACTS

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Neuro-fuzzy control of structures with MR dampers

Manuel Braz Cesar, Rui Barros

Abstract: ~Over the last decades, soft computing based controllers have being widely explored as an alternative to conventional control systems in many engineering applications. The ability of Intelligent and adaptive control systems to deal with uncertain systems and to change the controller behavior at different operating conditions constitute decisive advantages over conventional control systems that allows for the development of robust controllers for complex vibration engineering problems. In this regard, this paper aims to analyse the performance of a neuro-fuzzy controller in reducing seismic-induced vibrations in building structures a using a MR damper. The plant is a three degree-of-freedom system, which represent a three-story shear building structure. The semi-active control system is derived from an optimal controller. This controller is used to command a MR damper located between the ground and the first floor, i.e., in a non-collocated configuration. The data obtained from the optimal controller is used as a reference to train a fuzzy based controller via an Adaptive Neuro-Fuzzy Inference System (ANFIS). The uncontrolled response is compared with passive and semi-active controlled responses in order to assess the effectiveness of the proposed neuro-fuzzy controller.

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