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# SHAPE MEMORY ALLOY REINFORCED CONCRETE FRAMES VULNERABLE TO STRONG VERTICAL EXCITATIONS

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## Abstract

Reinforced concrete (RC) framed buildings dissipate the seismic energy through yielding of the reinforcing bars. This yielding jeopardizes the serviceability of these buildings as it results in residual lateral deformations. Superelastic shape memory alloys (SMAs) can recover inelastic strains by stress removal. This paper extends previous research by the authors that optimized the use of SMA bars in RC frames considering the horizontal seismic excitation by addressing the effect of the vertical seismic excitation. A steel RC six-storey building designed according to current seismic standards is considered as case study. Five different earthquake records with strong vertical components are selected for the nonlinear dynamic analysis. The results were used to evaluate the effect of the vertical excitation on the optimum locations of SMA bars.

Keywords: seismic damage; seismic residual deformations; shape memory alloy; superelasticity; moment frame; reinforced concrete, vertical seismic component

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