Evolutionary Aseismic Design And Control Of 3D Structures Using Passive Devices

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Current seismic codes do not incorporate a systematic methodology for the spatial distribution and properties of passive devices in three-dimensional structures that operate well within their inelastic range. To address the above an evolutionary computational optimization framework was developed to design and control regular and irregular buildings when subjected to a predefined seismic environment. From the evolutionary process, the optimal placement, strength and size of passive dampers throughout the height of the structures were obtained. The topological distributions of the braces throughout the height of the structure corresponded to patterns that were not seen in common practice. Furthermore, the optimization framework produced optimal designs with reduced drifts while reducing accelerations at the same time, when compared to the original base structure.