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Aseismic Design And Control Of Steel Frames Using Self-Centering Systems And Passive Dampers

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Conventional seismic protective systems have been successfully used to design buildings and structures subject to large ground motions. Life-safety and collapse prevention objective can be reliably achieved, however, significant damage and economic losses have been observed in previous events. In this work an evolutionary aseismic framework is developed for the design and control of structures with different self-centering systems and passive dampers. Optimal designs are identified that control not only drifts, thus protecting against life-safety and collapse prevention, but showcase enhanced seismic performance in terms of reduced residual drifts and economic losses after seismic events. The study includes optimal design of posttensioned self-centering connections using sacrificial (a) dissipating bars; (b) friction elements; (c) steel angles and (d) passive dampers (inerter dampers, etc.) for steel frames subjected to multiple earthquakes.