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*Seismic performance of special steel moment frames using detailed
vs simple hysteretic curves*

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Resumen:

Es una creencia común que modelos de estructuras que utilizan materiales bilineales sin degradación de resistencia o rigidez se comportan mejor que modelos de estructuras con materiales más detallados que incluyen degradación. Esta investigación se centra en los efectos de modelar las curvas histeréticas de vigas y columnas en pórticos especiales de acero resistente a momentos de dos formas diferentes. La estructura analizada es un pórtico especial resistente a momento de 8 pisos donde su rendimiento es obtenido mediante análisis estáticos y dinámicos. Al comparar derivas de piso y cuantificar energías en diferentes niveles de intensidad con múltiples sismos, se obtuvo que depender únicamente de la disipación de energía histerética como indicador del rendimiento sísmico es un error. La investigación incluye chequeos de comportamiento, como lo son el análisis de vibración libre, análisis modal, y análisis pushover, para validar la precisión de los modelos utilizados.

Palabras clave: Disipación de energía, FEMA P695, OpenSees, SSMFs, Porticos especiales de acero resistentes a momento.

Abstract:

It is a common belief that modeling structures using bilinear materials with no strength or stiffness degradation performs better than modeling structures with more detailed materials that include degradation. This investigation focuses on the effects of modeling the hysteretic curves of beams and columns in special steel moment-resisting frames in two different ways. The analyzed structure is an 8-Story Special Steel Moment Frame where its performance is measured employing static and dynamic analyses. By comparing inter-story drifts and quantifying energies at different intensity levels with multiple ground motions, it is revealed that relying solely on hysteretic energy dissipation as an indicator of seismic performance is misguided. The investigation includes thorough checks, such as free vibration analysis, modal analysis, and pushover analysis, to validate the accuracy of the models used.

Keywords: Energy Dissipation, FEMA P695, OpenSees, SSMFs, Special Steel Moment Frames



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