

Comparison of the Existing Damage Indices in Steel Moment-Resisting Frame Structures

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Abstract : Assessment of seismic behavior of frame structures is just done for evaluating life and financial damages or lost. The new structural seismic behavior assessment methods have been proposed, so it is necessary to define a formulation as a damage index, which the damage amount has been quantified and qualified. In this paper, four new steel moment-resisting frames with intermediate ductility and different height (2, 5, 8, and 12-story) with regular geometry and simple rectangular plan were supposed and designed. The three existing groups' damage indices were studied, each group consisting of local index (Drift, Maximum Roof Displacement, Banon Failure, Kinematic, Banon Normalized Cumulative Rotation, Cumulative Plastic Rotation and Ductility), global index (Roufaiel and Meyer, Papadopoulos, Sozen, Rosenblueth, Ductility and Base Shear), and story (Banon Failure and Inter-story Rotation). The necessary parameters for these damage indices have been calculated under the effect of far-fault ground motion records by Non-linear Dynamic Time History Analysis. Finally, prioritization of damage indices is defined based on more conservative values in terms of more damageability rate. The results show that the selected damage index has an important effect on estimation of the damage state. Also, failure, drift, and Rosenblueth damage indices are more conservative indices respectively for local, story and global damage indices.

Keywords : damage index, far-fault ground motion records, non-linear time history analysis, SeismoStruct software, steel moment-resisting frame

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