عنوان مقاله:

A Simplified Modal Pushover Analysis-based Method for Incremental Dynamic Analysis of Regular RC Moment-resisting Frames

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خلاصه مقاله:

Incremental Dynamic Analysis (IDA) procedure is now considered as a robust tool for estimating the seismic sidesway collapse capacity of structures. However, the procedure is time-consuming and requires numerous nonlinear response-history analyses. This paper proposes a simplified Modal Pushover Analysis (MPA) procedure for IDA of RC moment-resisting frames. The proposed method uses the dynamic response of an equivalent single-degree-of-freedom (SDOF) system, characterized by a bilinear relationship between the lateral force (F) and roof-displacement (D). The F-D relationship is determined by the 'first-mode' pushover analysis of the structure. Four regular RC moment-resisting frames designed based on the current US building codes are selected and subjected to the proposed method. The analysis results obtained from the original MPA-based IDA method, SPO2IDA and the method proposed by Shafei et al are also presented for comparison. The performance of the proposed method is then evaluated through comparisons with the results obtained from IDAs. The results show that the proposed method is able to efficiently estimate the dynamic capacity of the example buildings for different seismic performance levels. Nonetheless like to MPA-based IDA and SPO2IDA methods less accueate results are obtained by the proposed procedure for 16% and 84% IDA fractiles in most case studies.

کلمات کلیدی:

sidesway collapse capacity, Pushover analysis, IDA method, RC moment, resisting frame