عنوان مقاله:

VISCOUS DAMPER PLACEMENT OPTIMIZATION IN CONCRETE STRUCTURES USING COLLIDING BODIES ALGORITHM AND STORY DAMAGE INDEX

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خلاصه مقاله:

Dampers can reduce structural response under dynamic loads. Since dampers are costly, the design of structures equipped with dampers should make their application economically justifiable. Among the effective cost reduction factors is optimal damper placement. Hence, this study intended to find the optimal viscous damper placement using efficient optimization methods. Taking into account the nonlinear behavior of structure, this optimal distribution can be determined through meeting story-wise damping requirements such that the structure provides the minimum dynamic response and becomes economically justified. To compare the effect of different damper placement layouts on structural response and determine the objective function of optimization, the ratio of peak structural displacement to yield displacement was used as the damage index and objective function of optimization. Colliding Bodies' Optimization (CBO) algorithm was used for optimal damper placement. In this study, the ۳- and ۴-story concrete frames with different damper placement conditions were studied. Results confirmed the efficiency of the proposed method and algorithm in optimal viscous damper placement in each story. It was also discovered that the application of dampers on higher stories partially uniforms height-wise damage distribution and works towards the design goals.

کلمات کلیدی:

viscous damper, damage index, optimization, optimal position, nonlinear analysis

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