

عنوان مقاله:

TOPOLOGY OPTIMIZATION OF PERFORATED STEEL PLATE SHEAR WALLS WITH THICK PLATE IN SIMPLE FRAMES

محل انتشار:

مجله بهینه سازی در مهندسی عمران، دوره 9، شماره 3 (سال: 1398)

تعداد صفحات اصل مقاله: 26

نویسندگان:

M. H. Bagherinejad

A. Haghollahi

خلاصه مقاله:

In this paper, topology optimization (TO) is applied to determine the form, size and location of holes for the special form of perforated steel plate shear wall (PSPSW). The proposed model is based on the recently presented particular form of PSPSW that is called the ring-shaped steel plate shear wall. The strain energy is selected as the objective function in the optimization. Simple Isotropic Material with Penalization (SIMP) method and the solution algorithms, including sensitivity and condition-based methods are utilized in the TO. Four initial plate forms are presented in the TO with regards to the length of the connection between the plate and column. Based on the solution methods and initial forms of the plate, eight scenarios are proposed and seven different perforated plates obtained using TO. The nonlinear responses of the optimized perforated plates are compared together, and with the ring-shaped model as a benchmark. The nonlinear analysis is conducted under cyclic and monotonic loadings. Key issues include cyclic and monotonic behavior, pinching behavior, stiffness, load-carrying capacity, energy dissipation, fracture tendency and out-of-plane deformation are investigated and discussed. The results demonstrate the optimized models have better behavior than the ring-shaped model without changing the volume of the plate.

کلمات کلیدی:

topology optimization, perforated steel plate shear walls, SIMP method, sensitivity - based method, condition - based method.

لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/1831279>

