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Numerical Study of Horizontal Friction Dampers Made of Steel and Brake Pads in Chevron frame under Cyclic Loads

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Observations of damage to buildings in recent earthquakes indicate that some of the damage was in the area of welded joints. Due to the weakness in the joints, the idea of using a horizontal friction damper using brake pads in bracing openings, especially the chevron frame in steel structures has been proposed Which can be easily replaced after an earthquake.. The purpose of this study is to introduce a new friction damper with low manufacturing and installation costs and high efficiency. This friction device consumes vibrational energy with the help of friction caused by slipping of brake pads on steel surfaces , In this research, the numerical study of the friction damper of the brake pad and also the laboratory study of the materials used in this damper have been done. For this purpose, first a validation based on a laboratory model has been performed in ABAQUS software. In the following, 9 models are numerically studied in ABAQUS software and at the end, the optimal model of selective damping on a braced frame with porch decoration is analyzed. The results show that very high stress concentration occurs in the damping area of the brake pad after the load is applied to the bracing frame and due to the presence of dampers in other elements, including beams and columns, less stress is created than in the case without dampers. Also, among the studied models, the 10 screw model has the highest amount of energy absorption.

Keywords: Damper, Friction Damper, Chevron Frame,Brake Pad, Cyclic Loading.

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