Proceedings of the International Conference on Civil Engineering Fundamentals and Applications (ICCEFA'20)
Virtual Conference – September 7-8, 2020
Paper No. 135

Parametric Study of Energy Dissipating Steel Plate Fuses

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Abstract - Steel plate devices are broadly used in earthquake-resistant structures to provide energy dissipation. Understanding the cyclic response of these steel plate fuses requires comprehensive investigation of different fuse link design parameters. This goal can be achieved using finite element analysis. This paper presents the finite element modeling and sensitivity study of steel plate fuse links. Three-dimensional finite element models are first developed and validated against past experimental tests. While validating the finite element models, several important components, including element type, material and meshing properties, boundary conditions, loading profile, and analysis method are discussed. The design of experiment (DOE) is then used to generate factor combinations for the parametric study. Seven potentially influential design factors related to the material or geometry of steel plate fuses are considered as input factors. Next, the cyclic response of fuses is assessed in terms of initial stiffness, yield strength, ultimate stiffness, effective damping, maximum load capacity, and ductility. The percentage contribution of significant design factors on each cyclic response variable is obtained.

***Keywords*:** Finite element simulation, Steel plate fuse, Energy dissipating device, Sensitivity analysis, Statistical design of experiment.