4th International Civil Engineering & Architecture Conference
17-19 May 2025, Trabzon, Türkiye

Investigation of the non-linear design parameters of steel moment frames at different seismic sites in Turkey

Salah Eddine Hamadi [*1], Serkan Bekiroğlu [1]

[1] *Yıldız Technical University, Department of Civil Engineering, İstanbul, Türkiye*

Abstract. Turkey has a high seismicity and a considerable number of densely populated cities that are located along active faults. This paper investigates the nonlinear design parameters of steel moment frames at different sites in Turkey to evaluate the proportionality between the design parameters of the structure and those of the spectrum with the aim of enhancing the building design. For this purpose, steel moment frames are modeled using SAP2000; all the systems have the same characteristics except the span to height ratio. Then, the capacity spectrum method based on the ATC-40 procedure is performed to calculate the nonlinear behavior parameters for each system, including the effective damping ratio, stiffness ratio, ductility and reduction factor. Additionally, four different demand spectra that include different elastic design spectrum characteristics are used, precisely, the horizontal elastic design acceleration spectrum corner period T_B and the peak ground acceleration (PGA). Afterward, the comparison of the results yields substantial findings regarding the nonlinear behavior of the steel moment frame and the overall building design. This paper provides significant information to the designers about the structural behavior in terms of design parameters. In addition, it offers very important recommendations for researchers to conduct more relevant studies to develop new practical approaches to optimize the building design.

Keywords: Nonlinear behavior parameters; Steel moment frame; Design spectrum parameters; Capacity spectrum

https://doi.org/10.31462/icearc2025_ce_eqe_122

golden light publishing