Advance Researches in Civil Engineering
ISSN: 2645-7229, Vol.2, No.4, pages: 26- 37

An Investigation on the Effect of Infill Walls on the Fundamental Period of Moment-Resisting Steel Frames with Consideration of Soil-Structure Interaction

Kianoosh Kiani [1], Seyyed Mohammad Motovali Emami [2]*

[1] M.Sc. of structural engineering, Department of Civil Engineering, Islamic Azad University, Najafabad, Iran.

[2] Assistant Professor, Department of Civil Engineering, Islamic Azad University, Najafabad, Iran. (sm.emami@pci.iaun.ac.ir)*

(Date of received: 10/07/2020, Date of accepted: 28/12/2020)

ABSTRACT

One of the most critical parameters in process of analysis and design of structures is determination of the fundamental period of vibration. The fundamental period depends on the distribution of the mass and stiffness of the structure. Therefore, the building codes propose some empirical equations based on the observed period of real buildings during an earthquake as well as ambient vibration tests. These equations are usually a function of type and height of the buildings. Differences in the fundamental period of buildings determined by the code equation and analytical methods are due to elimination of the effects of non-structural elements in the analytical methods. For this reason, the presence of non-structural elements such as infill panels, which may produce a variation in these properties, should be carefully considered. Another effective parameter on the fundamental period is the influence of Soil-Structure Interaction (SSI). It is obvious that soil flexibility increases the fundamental period of the structure. The current research deals with the effect of infill panels on the fundamental period of moment resisting frames considering the influence of soil-structure interaction (SSI). For this purpose, 3, 6, 9, 12, 15 and 18 stores 2-D frames were investigated with different configuration of infill panel in the plan and also various percentage of infill openings. The studied frames were modelled and analyzed in Seismo Struct software. The calculated values of the fundamental period are compared with those of obtained from proposed equation in the seismic code. From the analysis of the results it has been found that the number of stores, the infill opening percentage, the stiffness of the infill panels and the soil type are crucial parameters that influence the fundamental period of steel building frames.

Keywords:

Fundamental period, Infill wall, Moment-resisting steel, Soil-structure interaction.