

Structural dynamic analysis of a frame structure with different sets of bolted joints

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ABSTRACT

A-frame structure is prevalent as an engineering structure as it is considered as the foundation for many other structures such as buildings, vehicles, communication towers and others. The study on frame structure has gained a lot of interest in the field of material application, stability, joints application and many other topics. This study aims to investigate the modal behaviour of a frame structure with different sets of bolted joints, materials and also different boundary conditions. The frame structure was put under different boundary conditions and the structure was modelled by incorporating different sets of bolts. The effect of the changes towards the modal behavior (natural frequencies and mode shapes) was analysed. The modal analysis was conducted computationally by using the finite element software package MSC. Natran/Patran in normal modes analysis (SOL103). From the analysis, it was found that the frame structure under free-free boundary conditions produced lower natural frequencies than the structure with fixed at the bottom. The value of natural frequencies also is lower when single bolt was assigned at each of the joint location on the frame structure compare to when the bolts were doubled at joint area. Other than that, between free-free and fixed-free boundary condition, fixed-free is more rigid than free-free condition and for extra rigidity of frame structures, double bolted model is better than single bolted. From the results, the better idea in order to make frame structure is by made up of steel, double bolted it and make it fixed-free condition.

KEYWORDS

Frame structure; Vibration; Joints

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