Effect of Structural and Non-structural Walls on Seismic Behaviour of RC Buildings
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Abstract
The socio-economy of Oman mainly depends on construction and infrastructure development of the country, which is the major contributor to capital generation and employment. The built environment has a major influence on the quality of life of the society and on the economic prosperity of society. Reinforced concrete structures can be designed to be resilient to severe storms, fire, and earthquakes as well as to be durable in severe environmental exposures. The pushover analysis is a nonlinear static procedure, which is a very useful tool to evaluate the seismic performance of buildings. Because of the lack of national design provisions in the past, the seismic loads have mostly been ignored during the design of building in Oman. This was not a huge concern, because of low seismicity in the region and the lack of tall buildings. However, in recent decades, with increased demand, more mid-rise and high-rise buildings are being constructed. This study investigates the behaviour of reinforced concrete buildings using pushover analysis. Which is a nonlinear static procedure which is a very useful tool to evaluate the seismic performance of buildings. In this research, the influence of infill wall, structural walls and cladding are discussed using three building heights (5-storey, 10-storey and 15-storey). A bare frame system is considered as the reference. The ETABS (Extended Three-dimensional Analysis of Building Systems) 2016 program was used to model and analyse the buildings. The pushover analysis was carried out according to FEMA (Federal Emergency Management Agency)-356, until the structure reached failure, considering one of the two transverse directions (X or Y). The pushover curve is plotted between base shear vs. roof displacement to evaluate the seismic performance of each building. These models were compared in terms of the time period, base shear, storey drift, and plastic hinges. The results show that the lowest displacement and highest base shear was recorded for masonry building in X-direction and Y-direction. In addition, the height of the storey vs. monitored displacement, the masonry model is best compared to other models in both directions of pushover analysis.
direction. This indicates that the inclusion of infill walls is essential to properly predict the seismic behaviour of a building.