

Assessment of Seismic Behavior of Masonry Minarets by Discrete Element Method

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Abstract : Mosques and minarets can be severely damaged as a result of earthquakes. Non-linear behavior of minarets of Mihrimah Sultan and Süleymaniye Mosques and the minaret of St. Sophia are analyzed to investigate seismic response, damage and failure mechanisms of minarets during earthquake. Selected minarets have different height and diameter. Discrete elements method was used to create the numerical minaret models. Analyses were performed using sine waves. Two parameters were used for evaluating the results: the maximum relative dislocation of adjacent drums and the maximum displacement at the top of the minaret. Both parameters were normalized by the drum diameter. The effects of minaret geometry on seismic behavior were evaluated by comparing the results of analyses.

Keywords : discrete element method, earthquake safety, nonlinear analysis, masonry structures

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