

FINDING THE EFFECTIVE PHILOSOPHY FOR SEISMIC REHABILITATION OF CYLINDRICAL MASONRY TOWERS, CASE STUDY: TUGHRUL TOWER

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The purpose of this study is to find the most effective technique for seismic rehabilitation of Cylindrical Masonry Towers, and different ideas for rehabilitation were implemented in a case study. The studies focuses on the Tughrul Tower, the 800 years old masonry tower which is located in Rhey, south of Tehran, capital of Iran. The history of tower returns to Saljoghian (Seljuk) era. The modeled tower has been showed in picture.



Figure 1. Tughrul Tower.

The tower has cylindrical shape without roof, and it has been retrofitted several times during the previous century and the last retrofitting has been done about 20 years ago. The author's study has been shown that the seismic demand of the tower is considerably greater than its capacity, so it is necessary to be rehabilitated as soon as possible.

Another issue about is this structure is there was not any information about the material of the tower and the responsible organization does not allow for any sampling, so the ancient masonry materials have been considered based on some other researchers paper (Figueiredo et al., 2013).

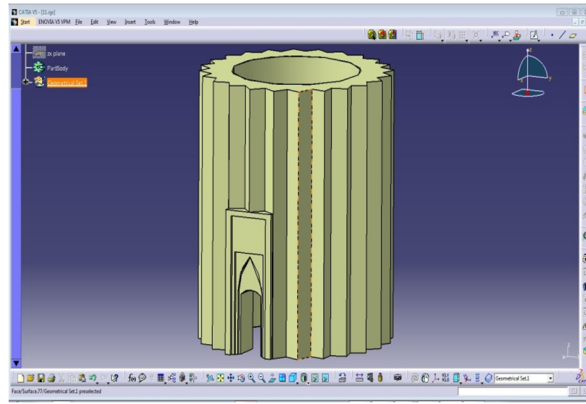


Figure 2. Modeled structure.

For increasing the seismic capacity of the tower, well-known method of installing FRP Belts and for decreasing the seismic demand of the tower, Base Isolation method, were investigated (Haidarbaigi & Homami, 2019). The structure has been modeled in finite element software. Two earthquake codes have been imported and the structure has been analyzed. Two earthquake codes are far field and near field because the real structure is near both far field and near field faults. The rehabilitating methods have been modeled and imported to the structure, then two earthquake codes imported and the structure analyzed.

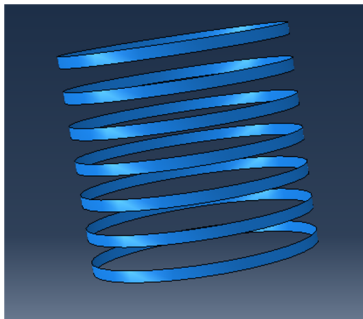


Figure 3. FRP Belts.

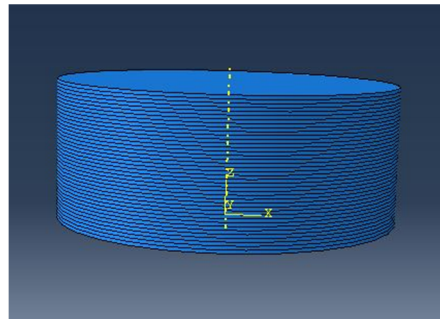


Figure 4. Base Isolator.

Two rehabilitated structures have been compared to each other. It is shown that the rehabilitation philosophy of reducing the seismic demands for the tower is more effective than the philosophy of increasing the masonry tower seismic capacity.

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