

Master Thesis

Application of Wave Barriers in the Reduction of Masonry Building Vibration Due to Induced Seismicity by Geothermal Power Plants Activity

Motivation:

The geothermal power plants are kind of new green energy resources widely developing all around the world. The operation of such power plants lead to the some minor to moderate earthquakes that can affects the old masonry buildings, with some sort of cracks and undesired vibrations.

As it is difficult or even unpractical to retrofit the unreinforced masonry buildings by adding some structural elements to them, it could be a good alternative to assess the application of remote retrofitting approaches. Here, this remote retrofitting means the application of wave barriers to reduce the ground vibration levels before arriving to the building.

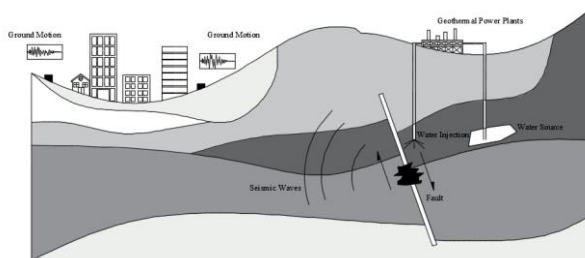


Figure 1: the mechanism of development of induced earthquake by the geothermal power plants.

Tasks:

In this thesis, the application of wave barriers to mitigate the response of masonry building is going to be investigated by using a 3D finite element model and performing the nonlinear dynamic time history analysis.

Also it is aimed to assess the properties, as well as the appropriate geometry for the wave barriers to act optimally in the reduction of undesired vibration in different soil conditions.

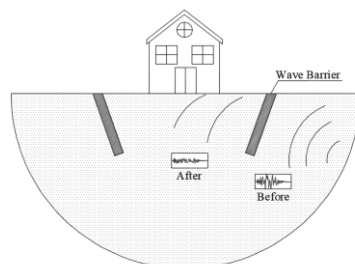


Figure 2: Wave barriers.

Finally, the vibrations at the building floors should be assessed before/after the application of wave barrier to see whether it can work efficiently to increase the comfortness of building owners due to induced earthquake by the geothermal power plants or not.

The thesis should be written in English. All the meetings and communication is in English language too.

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Literature:

Dolatshahi KM, Rezaie A, Rafiee-Dehkharghani R, (2020) Topology Optimization of Wave Barriers for Mitigation of Vertical Component of Seismic Ground Motions. *Journal of Earthquake Engineering* 24(1): 84-108.

Rezaie A, Rafiee-Dehkharghani R, Dolatshahi KM, Mirghaderi SR, (2018) Soil-buried wave barriers for vibration control of structures subjected to vertically incident shear waves. *Soil Dynamics and Earthquake Engineering*,109:312-323.