BEHAVIOR STUDY OF AN INFILL FRAME USING FINITE ELEMENT METHOD SOFTWARE BASED

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ABSTRACT

Infrastructure constructions in an earthquake-prone areas need a great design process, including correctly structural modelling for reducing damage because of an earthquake. Most of structural analysis still use open frame method that do not consider stiffness contribution of masonry panel to stiffness and strength of the whole structure, whereas that masonry panel have a great effect in building behavior on respond an earthquake.

In modelling a structure that consider masonry panel effect, masonry panel can be modelled as diagonal strut, and commonly use method are Hoobs's and FEMA 356. However, behavior of frame with a masonry infill because of a lateral load is complicated and non-linear. So, in order to modelling this cases correctly use a diagonal strut method before modelling, response of this infill frame should be known first use modelling in finite element method software based.

Parameters that are considered in modelling masonry infill frame are: dimension, material property, boundary condition and loading. Each models are different in width and height ratio (B=1.25H, B=H, B=0.625H), but they show almost same cracking pattern that form 45° diagonal crack, from loading zone and bottom opposite zone to the middle area. The most main directional stress of concrete panels happens in beam-column joint and estimated to get crack first.

Result of comparison force - displacement diagram, can be known that Hoobs's method of equivalent diagonal strut relatively coincide analytical FEM model, but quite difficult to implement. The highest accuracy of this method happens in panel with width ratio is more than its height, with 97.99% of accuracy. Whereas models with FEMA 356's method the force - displacement diagram are not relatively coincide analytical one, but more easy to implement. The highest accuracy of this method happens in panel with width ratio is more than its height, with 90.97% of accuracy. By known response and accuracy of diagonal strut method, be expected structural analysis that consider masonry panel can be done and get closer to structural reality. With modelling correctly, damage and failure can be avoided by creating higher performance of civil building.

Keywords: Infill frame, masonry, finite element method, software