COMPUTER MODEL FOR PRECAST BEARING WALL

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1. INTRODUCTION

Computer modeling and structural analysis of precast bearing wall system is still questionable and unclear for design engineer. Because of the connections in precast wall system differently behave from that of cast-in-place shear wall, the continuous modeling does not govern all structural response and unsafe design. This paper proposed the analysis of test results from precast bearing building system in Thailand [1] under cyclic load by computer programing. CSI ETABS commercial computer program is used in this study because it is widespread used for structural engineer in earthquake resistant building design. The results of this study can be further developed to be a full model of the entire building.

2. METHODOLOGY

The tested specimen Wall1 with 3 cross over dowel bars and Wall3 with 4 cross over dowel bar are selected and model. Precast wall panel is model with non-linear layered shell element. There are 4 millimeter diameter with spacing 150 mm in both direction is assigned to wall panel. The compressive strength of concrete 42MPa is also assigned for wall panel.

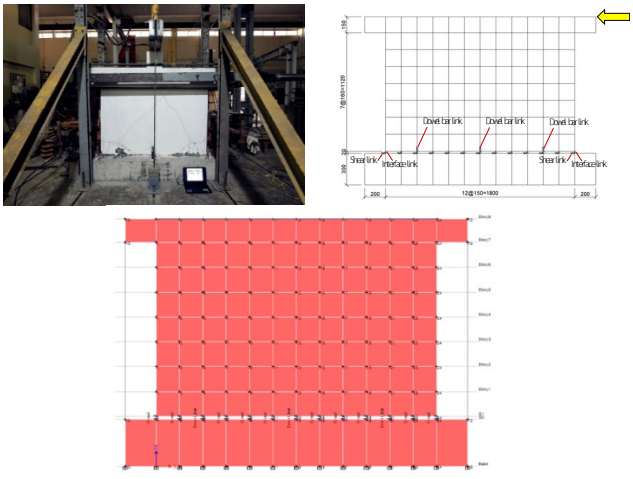

Figure 1. proposed model for specimen wall1

The vertical link (interface link) represented the compressive behavior of cement grout between precast wall and foundation is created from the relationship of stress and strain of cement grout, compressive strength, 50 MPa. The other vertical link (dowel bar link) represented the dowel bar behavior is created from vertical force in dowel bar exacted from stress-strain of steel relationship and bond slip model. The horizontal link represented the shear friction between precast wall and foundation [2].

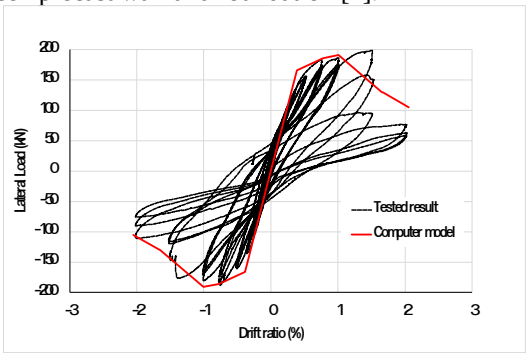

Figure 2. Comparison between computer model and tested result.

3. RESULTS

The analysis by non-linear static push over showed that the proposed model was able to predict the relationship between envelope load and story drift closed to the tested result. The stiffness and maximum load are almost same.

4. CONCLUSIONS

Proposed computer model of precast bearing wall shows good agreement with tested result in term of stiffness, envelop load, and maximum load. The model can be modified to be a simplify model in order to develop for full building and connection design for precast concrete bearing wall under seismic load.

5. REFERENCE

[1] Pimanmas, A., Thammarak, P., Chotesuwan A., Yooprasertchai, E., Wiwatrojanagul P., and Chaimahawan P., "Study of Seismic Resistance of Precast Concrete Structures," Full Research Report submitted to the National Research Council of Thailand (NRCT), (2021).

[2] Yooprasertchai, E., Wiwatrojanagul P., Suwansaya P., and Pimanmas, A., "Seismic Behavior of Precast Concrete Load Bearing Walls with Welded Rebar Connections," SWU Engineering Journal (2018) 13(1), 39-51.

6. AUTHOR BIOGRAPHIES

Preeda Chaimahawan obtained Ph.D. in Engineering from Sirindhorn International Institute of Technology, Thammasat University, Thailand. He is currently an associate professor at School of Engineering, University of Phayao. His research interests include precast concrete structure, seismic retrofit, FRP strengthening and design of structure under earthquake load.

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