Evaluation of force-based and displacement-based out-of-plane seismic assessment methods for unreinforced masonry walls through refined model simulations

Supplemental material

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This repository contains the results of discrete element simulations used to study the response of vertically-spanning unreinforced masonry walls under different wall configurations. The simulations are run using the software package UDEC 6.0 (Itasca). The dataset has served as basis for the study conducted in the paper: *Evaluation of force-based and displacement-based out-of-plane seismic assessment methods for unreinforced masonry walls through refined model simulations* (Godio and Beyer, 2019).

The repository is available on Zenodo at the link: http://doi.org/10.5281/zenodo.1491190

Content

The repository contains two datasets:

01_UDEC_VALIDATION contains UDEC source files and model outputs used for the validation of the discrete element model against the results of static pushover and dynamic free-release and shake table tests

02_UDEC_RESULTS contains UDEC source files and model outputs of incremental dynamic analyses used as basis for the parametric study performed to investigate the response of different wall configurations

Dataset structure

Each dataset is structured as follows:

01_UDEC_VALIDATION

01_PUSHOVER_TESTS contains model source and output files for simulations carried out in section 4.5.1 (Figure 4 of the article)

01_UDEC_MODELS for each specimen (S) includes

- model source files in .dat format

02_UDEC_RESULTS for each specimen (S) includes

- relative wall mid-height horizontal (X) and vertical (Y) displacement

- horizontal (H) and vertical (V) wall reaction force

02_RELEASE_TESTS contains model source and output files for simulations carried out in section 4.5.2 (Figure 5 of the article)

01_UDEC_MODELS for each specimen (S) includes

- model source files in .dat format for each specimen (S);

02_UDEC_RESULTS for each specimen (S) includes

- relative wall mid-height horizontal (X) and vertical (Y) displacement

- horizontal (H) and vertical (V) wall reaction force

- time array

📁 **03_SHAKE_TABLE_TESTS** contains model source and output files for simulations carried out in section 4.5.3 (Figure 6 of the article)

📁 **01_UDEC_MODELS** for each specimen (S) includes

- model source files in .dat format for each specimen (S);

- velocity time histories to be used as input for the simulations*

📁 **02_UDEC_RESULTS** for each specimen (S) and record, it includes

- wall mid-height horizontal (X) and vertical (Y) displacement

- wall base horizontal (X) displacement

- wall top horizontal (X) and vertical (Y) displacement

- horizontal (H) and vertical (V) wall reaction force

- time array

* velocity histories were converted from records provided by prof. M. C. Griffith, University of Adelaide. Reference: Griffith et al, 2004. 'Experimental Investigation of Unreinforced Brick Masonry Walls in Flexure' DOI: doi.org/10.1061/(ASCE)0733-9445(2004)130:3(423)

🗄 **02_UDEC_RESULTS**

📁 **01_SPO** contains results from static pushover analysis for every configuration C (refer to Table 2 of the article)

📁 **C0**

📁 **C1**, ...,

📁 **C16** include

- udec.ini: UDEC model used for simulation

- xacc_n_high: horizontal (x) abs acceleration measured at the top right corner of the brick n

- xacc_base: horizontal (x) abs acceleration measured at the base support block

- xacc_top: horizontal (x) abs acceleration measured at the top support block

- xdisp_n_high: horizontal (x) abs displacement measured at the top right corner of the brick n

- xdispbase: horizontal (x) abs displacement measured at the base support block

- xdisptop: horizontal (x) abs displacement measured at the top support block

- xforce_base: horizontal (y) reaction force at base support block

- xforce_top: horizontal (y) reaction force at top support block

- yacc_n_high: vertical   (y) abs acceleration measured at the top right corner of the brick n

- ydisp_n_high: vertical   (y) abs displacement measured at the top right corner of the brick n

- ydispbase: vertical   (y) abs displacement measured at the base support block

- ydisptop: vertical   (y) abs displacement measured at the top support block

- yforce_base: vertical   (y) reaction force at base support block

- yforce_top: vertical   (y) reaction force at top support block

📁 **02_THA** contains results from incremental dynamic analyses for every configuration

📁 **C0**

📁 **C1**, ...,

📁 **C16** include results for a given record (refer to see Table A1 of the article)

📁 **BONDS**

📁 **ELCENTRO7**, ...,

📁 **TOLMEZZO** include results for given time history analysis of the IDA (the last value in folder name is the scaled PGA, e.g. 5p5 = 5.5g)

📁 **BONDS_0_t_0.2_E_125_ax_0_0p5**, ...,

📁 **BONDS_0_t_0.2_E_125_ax_0_5p5**:

- BONDS_0_BASE_0p5, BONDS_0_TOP_0p5: input velocities of UDEC model at base**

- udec.ini: UDEC model used for simulation

- xacc_n_high: horizontal (x) abs acceleration measured at the top right corner of the brick n

- xacc_base: horizontal (x) abs acceleration measured at the base support block

- xacc_top: horizontal (x) abs acceleration measured at the top support block

- xdisp_n_high: horizontal (x) abs displacement measured at the top right corner of the brick n

- xdispbase: horizontal (x) abs displacement measured at the base support block

- xdisptop: horizontal (x) abs displacement measured at the top support block

- xforce_base: horizontal (y) reaction force at base support block

- xforce_top: horizontal (y) reaction force at top support block

- yacc_n_high: vertical (y) abs acceleration measured at the top right corner of the brick n

- ydisp_n_high: vertical (y) abs displacement measured at the top right corner of the brick n

- ydispbase: vertical (y) abs displacement measured at the base support block

- ydisptop: vertical (y) abs displacement measured at the top support block

- yforce_base: vertical (y) reaction force at base support block

- yforce_top: vertical (y) reaction force at top support block

** filename = record_name + 0 + BASE/TOP + pga_value