FRAGILITY FUNCTIONS FOR A CODE DESIGNED URM INFILLED RC FRAME BUILDING

NSF Funded Project with Collaboration from PEER

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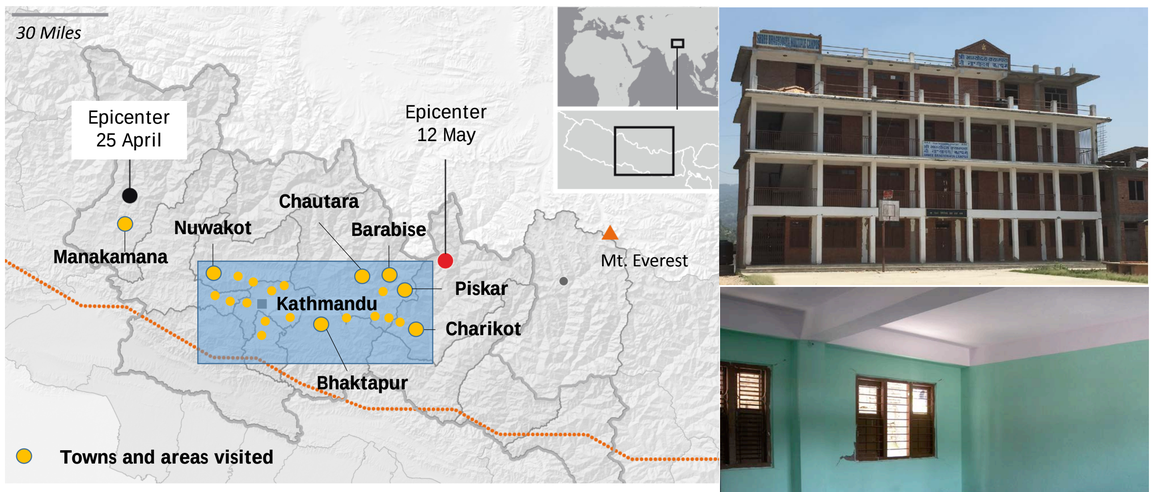
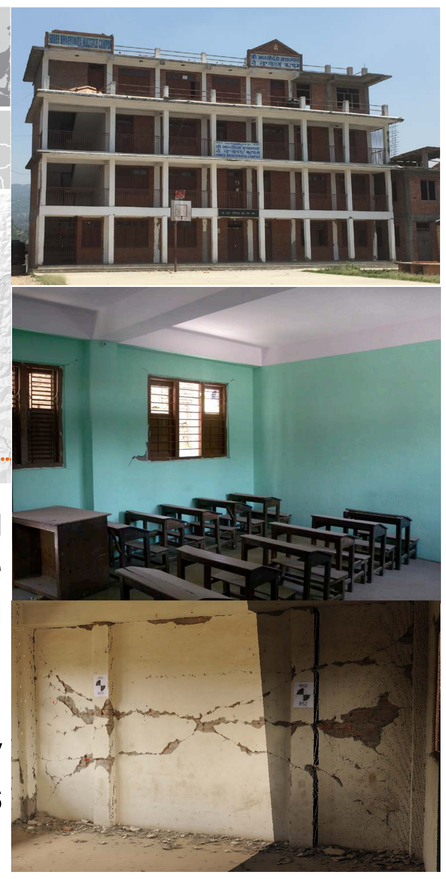
1.Motivation

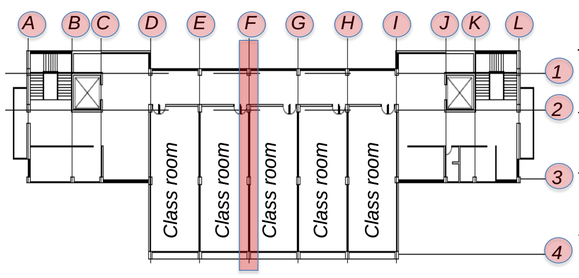




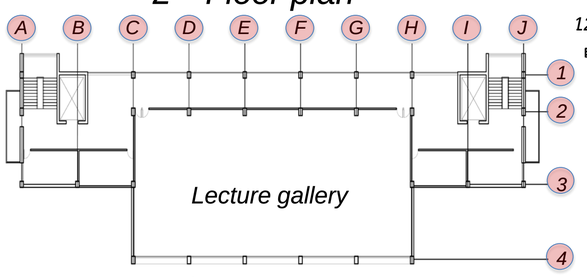
- Infilled reinforced concrete building performance data collection in the aftermath of the April 25, 2015 Nepal Earthquake (NSF Award #1545632).
- Quantitative damage assessments.
- Need for development of fragility functions for these types of buildings was identified.

2.Case Study Frame

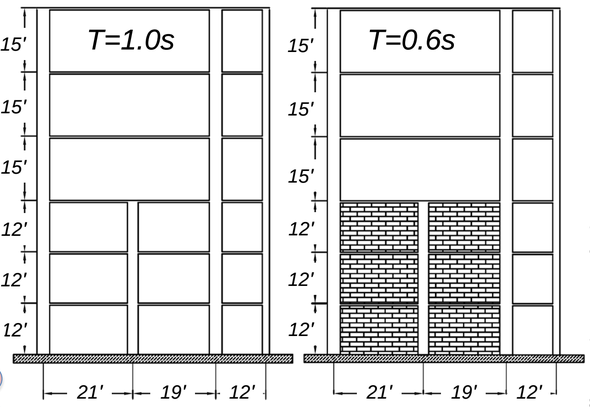
- Analyzed Infilled RC frame is an internal frame of an existing 6-story building of Dhaka Medical College Hospital, Bangladesh.
- Designed according to Bangladesh National Building Code (BNBC) which follows International Building Code (2006) and ACI 318.



2nd Floor plan



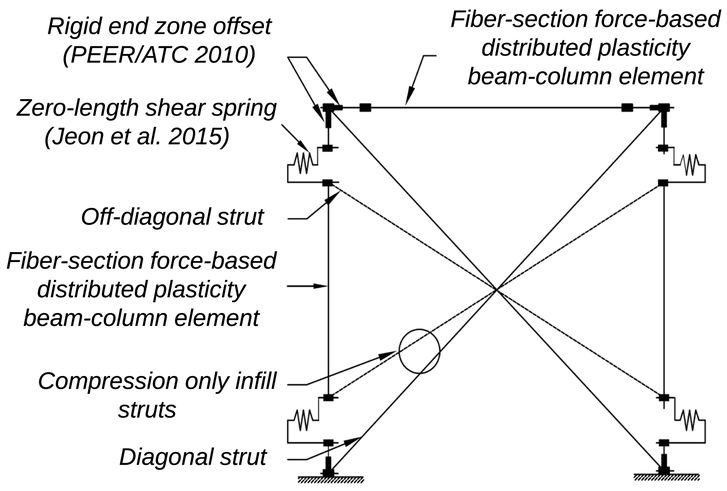
3rd Floor plan



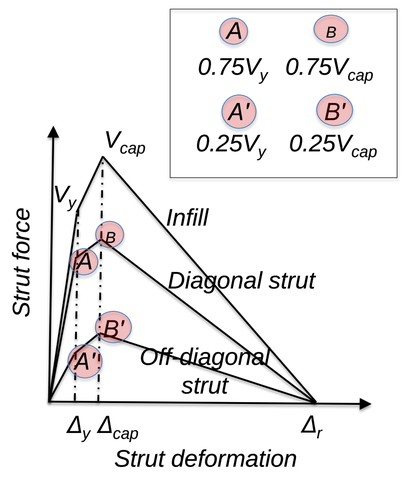
(a) Bare frame (b) Frame with existing infill

Cases considered in the masonry infill configuration for the RC frames

3.Modeling Scheme



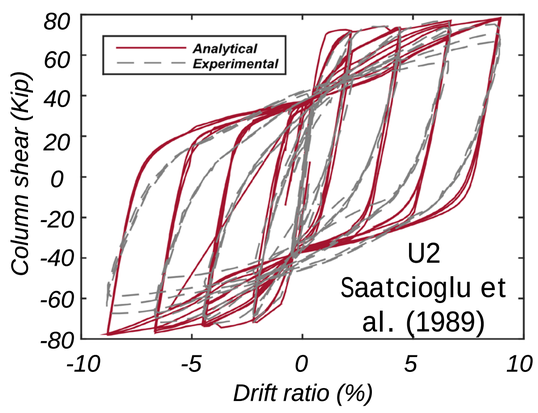
Schematic of infill frame model



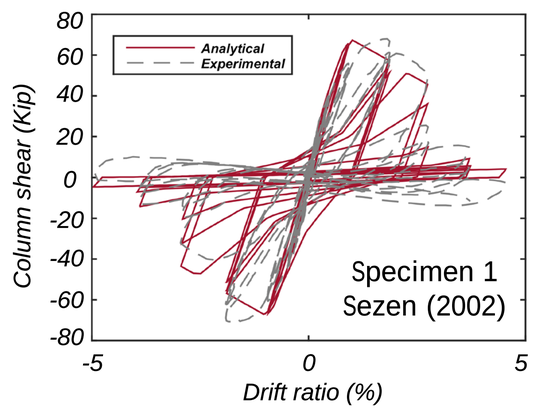
Tri-linear backbone curve for infill strut model (Burton & Deierlein 2013)

- Infill struts lateral strength, V_{cap} is based on work by Mehrabi et al. (1994).
- Initial stiffness is computed using the models by Saneinejad and Hobbs (1995).

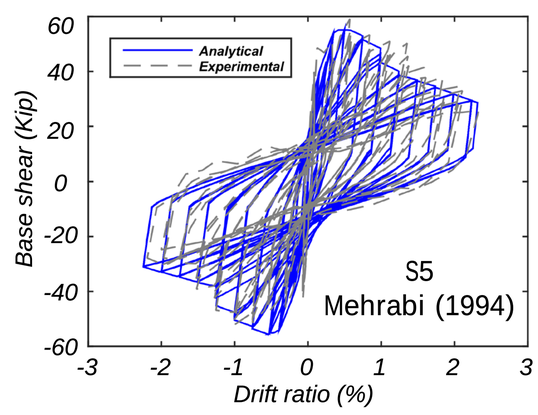
4.Component Validation



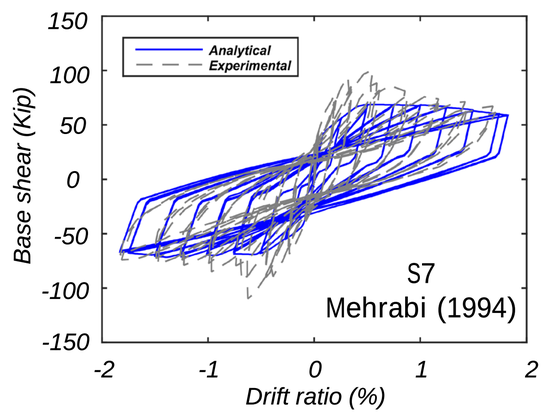
(a) Column flexural failure



(b) Column flexural shear failure



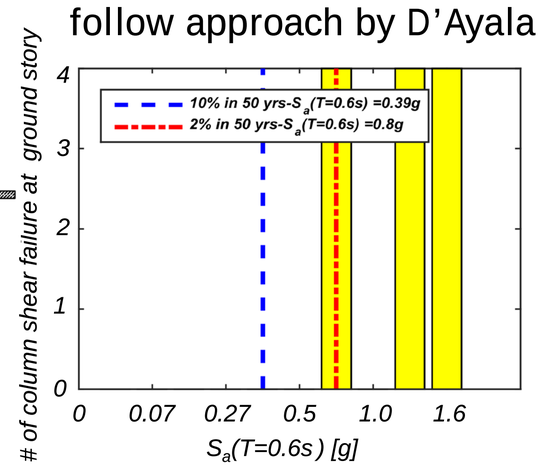
(c) Weak frame-solid infill (with column shear failure)

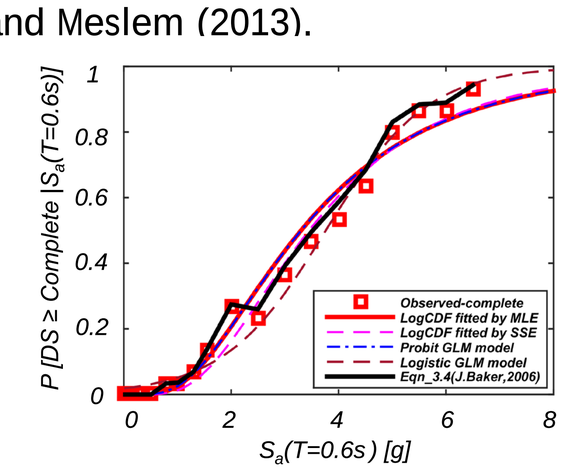


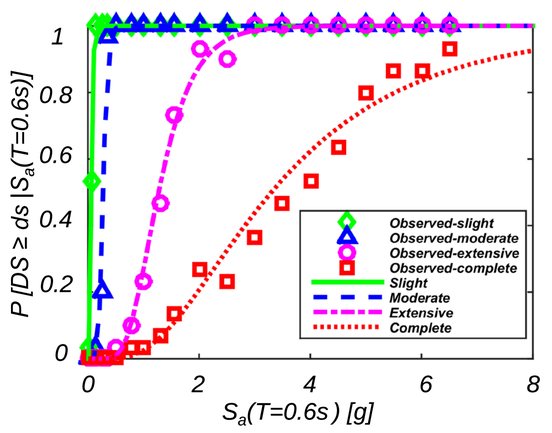
(d) Strong frame-solid infill (without column shear failure)

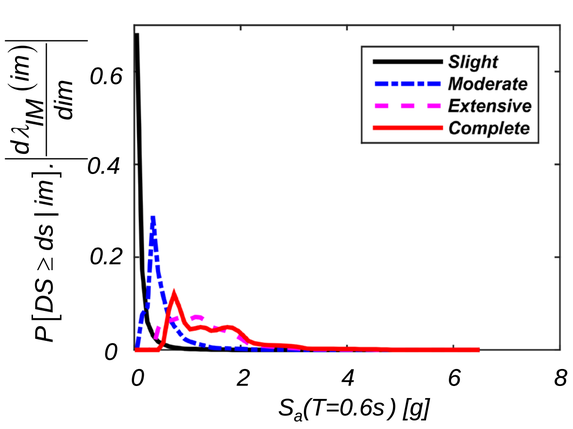
5.Fragility, Probabilistic Seismic Demand, and Loss Assessment

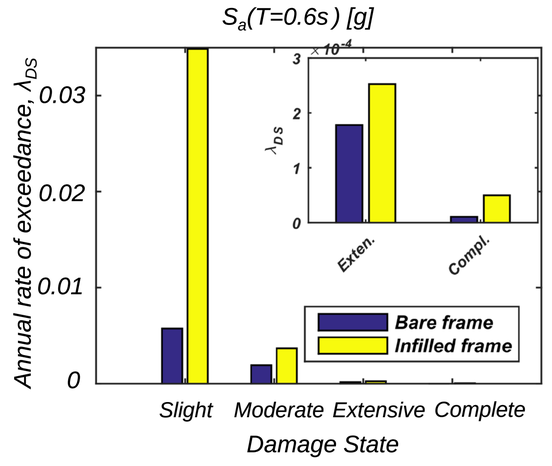
- The nonlinear structural model is analyzed following MSA approach using 30 GMs per intensity level for 20 intensity levels. GMs are selected for a site in Salem, OR having similar seismicity in Dhaka using Conditional spectra.
- Fragility curves are developed using generalized linear models.
- Definition of limit states for RC frame and infilled RC frame follow approach by D'Ayala and Meslem (2013).

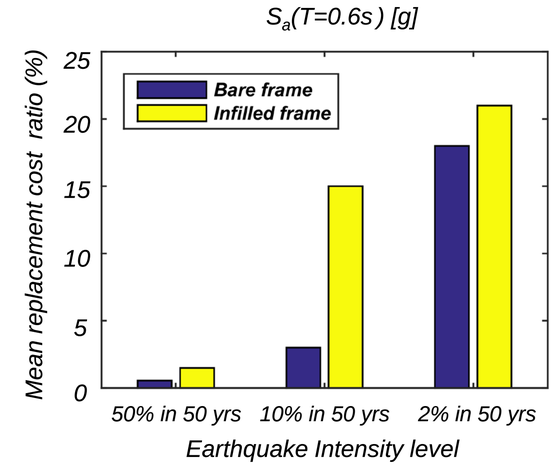












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