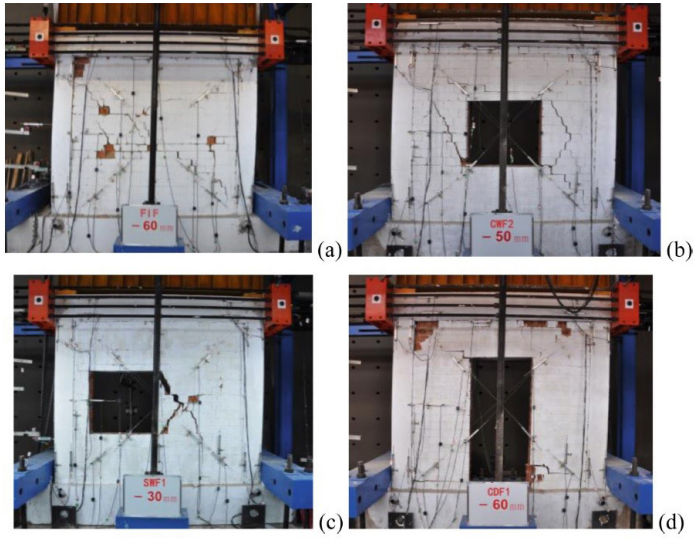
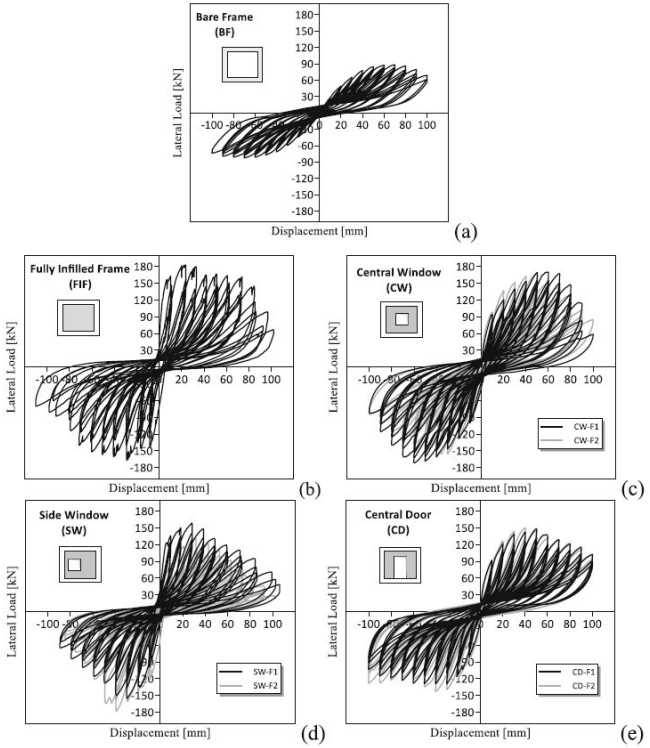


Damage patterns of the specimens at the peak load: (a) Fully infilled frame (FIF); (b) Central window (CW); (c) Side window (SW); (d) Central door (CD).



Cyclic responses of the specimens:(a)Bare frame(BF);(b)Fully infilled frame(FIF);(c) Central window (CW); (d) Side window (SW); (e) Central door (CD).

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Dottorato di ricerca in Architettura: innovazione e patrimonio

XXXV ciclo

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Seismic Vulnerability of Infilled RC Frame Structures

Tutor	Prof. Ing. Camillo Nuti
Curriculum	Cultura della costruzione
Settore disciplinare	ICAR/09

Abstract

The impact of infill panels on the seismic response of reinforced concrete (RC) frames is well-recognized, with extensive research encompassing experimental investigations and analytical modeling. This study focuses on materials and structures commonly used in Pakistan and China.

Experimental tests at Zhejiang Technical University, China, aimed to understand the effects of infill walls on the seismic performance of RC buildings. The study included eight RC frames: a bare frame, fully infilled frame, and six partially infilled frames with different window and door configurations. Detailed examinations were conducted on bricks, mortar, and masonry walls.

Additional tests at the University of Engineering & Technology (UET) Peshawar and International Islamic University, Islamabad (IIUI), Pakistan, targeted masonry walls, bricks, mortar, and concrete, providing valuable insights.

A 2D numerical model for infill walls was developed in this thesis, offering practical benefits. Analytical models for masonry walls in RC infilled and masonry buildings were introduced based on experimental results. The thesis details modeling techniques, formulations, and results for RC infilled frames.

This research presents notable contributions: an extensive experimental campaign on frames and masonry walls, a validated numerical model for infill walls, and a model predicting masonry strength.

Chapters cover a general introduction, literature review, a simplified 2D model for infill walls, experiments on masonry walls, and seismic tests on RC frames. Recommendations for future research conclude the thesis.