Bulletin of Earthquake Engineering
https://doi.org/10.1007/s10518-025-02112-1

ORIGINAL ARTICLE

Seismic behavior of RC frames with Choh-kat openings: a novel strut model approach

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Received: 30 June 2024 / Accepted: 24 January 2025

Abstract
This study investigates the seismic behavior of Masonry Infill Reinforced Concrete (RC) frames with Choh-kat-framed openings, common in the Kashmir region. It challenges traditional assumptions about infill structures, emphasizing their structural significance and providing new insights into how these infills influence seismic performance. The primary focus is on analyzing the impact of Choh-kat-framed openings on the lateral stiffness of RC frames under seismic loading and developing a novel strut model for predicting seismic response. A Finite Element (FE) approach is employed to simulate the complex interactions between the RC frame and Choh-kat-framed infills. The analysis considers several response parameters, including lateral stiffness, crack propagation patterns, load-bearing capacity, and energy dissipation. The study also examines the effects of different opening sizes, aspect ratios, locations, and multiple openings on structural performance. A key innovation is the introduction of an alteration factor β_{wc} to account for stiffness, alongside a new 4-strut model for Choh-kat-framed openings. The results indicate that Choh-kat-framed openings up to 50% of the infill area contribute to decreased stiffness but delay crack propagation. The optimal opening area ratio for enhancing stiffness is 12%. Choh-kat additions significantly increase stiffness, especially at the top corners of the openings. The proposed strut model, validated by FEMA 356 guidelines, accurately predicts equivalent strut widths for pier and spandrel struts. In summary, this study offers a novel approach to understanding the seismic behavior of Masonry Infill RC frames with Choh-kat openings, providing a framework for improved design and retrofitting strategies.

Keywords Choh-kat · Earthquake · Infill · Masonry · Reinforced concrete frames

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Published online: 18 February 2025