

Finite Element Interface Modeling and Experimental Verification of Masonry-Infilled R/C Frames

Ghassan Al-Chaar,¹ Armin B. Mehrabi², and Teymour Manzouri³

Abstract:

To study the means and methods of modeling masonry-infilled reinforced (R/C) structures, a comprehensive review of previous work and an analytical investigation were conducted. This paper summarizes the results of those studies, which specifically addressed the performance of R/C frames infilled with unreinforced concrete masonry panels and subjected to in-plane lateral loading. The objective in modeling masonry-infilled frames has always been to develop a simple model that would capture characteristics of the masonry. Achieving this objective requires understanding the behavior in more detail than provided by strut and beam models. The only feasible approach for simple and accurate modeling is to identify relevant parameters and employ numerical simulation, using well-calibrated analytical and experimental models to replace most of the expensive physical modeling. The aims here were to identify such numerical finite element models, demonstrate their capabilities, and facilitate the use of those models by identifying a commercial finite element analysis program having similar capabilities. The finite element models identified were (1) a cohesive interface model to simulate the behavior of mortar joints between masonry units and the frame/panel interface, and (2) a smeared crack formulation to model the concrete. Verification studies were carried out to determine the capabilities and limitations of the models.

To purchase full article: Please use this direct link to purchase the TMS Journal Volume of this article, Volume 26, Issue 1: <https://masonrysociety.org/product/tms-ejournal-vol-26-no-1/>

Otherwise, consider becoming a TMS member for full access to all TMS Journal articles: <https://masonrysociety.org/membership/#join>

DOI: 10.70803/001c.138969

¹ Structural Engineer, U.S. Army Engineer Research and Development Center – Construction Engineering Laboratory, 2902 Newmark Dr., Champaign, IL.

² President, Bridge Engineering Solutions, Inc., 1706 Aralia Dr., Mt. Prospect, IL.

³ President, Trilogy Consultants, Inc., 440 Huehl Rd., Northbrook, IL.