

## Influence of high axial compression ratios in RC columns on the seismic response of MRF buildings

Sergio Villar-Salinas<sup>\*1</sup>, Sebastián Pacheco<sup>2a</sup>, Julián Carrillo<sup>3b</sup> and Francisco López-Almansa<sup>4c</sup>

<sup>1</sup>Civil and Environmental Engineering Department, Universidad Tecnológica de Bolívar,  
Campus Tecnológico km 1 Vía Turbaco, 130011, Cartagena de Indias, Colombia

<sup>2</sup>Engineering/Research Department, PCEM SAS, Diag. 31 # 54-215, Santa Lucía, cc. Ronda Real of. 507,  
130006, Cartagena de Indias, Colombia

<sup>3</sup>Department of Civil Engineering, Universidad Militar Nueva Granada, Carrera 11 No. 101-80, Edificio F, Piso 2,  
49300, Bogotá D.C., Colombia

<sup>4</sup>Department of Architecture Technology, Universitat Politècnica de Catalunya-BarcelonaTech (UPC), 08028, Barcelona, Spain

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**Abstract.** Poorly designed reinforced concrete (RC) columns of actual moment-resisting frame (MRF) buildings can undergo Axial Compression Ratios (ACR) so high as their demand exceeds their capacity, even for serviceability gravity load combinations, this lack commonly leads to insufficient seismic strength. Nonetheless, many seismic design codes do not specify limits for ACR. The main contribution of this research is to investigate the need to limit the ACR in seismic design. For this purpose, three prototype 6 and 11-story RC MRF buildings are analyzed in this paper, these buildings have columns undergoing excessive ACR, according to the limits prescribed by standards. To better that situation, three types of alterations are performed: retrofitting the abovementioned overloaded columns by steel jacketing, increasing the concrete strength, and reducing the number of stories. Several finite element analyses are conducted using the well-known software SAP2000 and the results are used for further calculations. Code-type and pushover analyses are performed on the original and retrofitted buildings, the suitability of the other modified buildings is checked by code-type analyses only. The obtained results suggest that ACR is a rather reliable indicator of the final building strength, hence, apparently, limiting the ACR in the standards (for early stages of design) might avoid unnecessary verifications.

**Keywords:** axial compression ratio; modal pushover analysis; retrofitted RC buildings; seismic performance; steel jacketing

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\*Corresponding author, Assistant Professor  
E-mail: svillars@utb.edu.co

<sup>a</sup>Research Assistant

<sup>b</sup>Professor

<sup>c</sup>Emeritus Professor