Flexural Behavior of Reinforced Masonry Shear Walls with Unbonded Reinforcement

Alok Madan[1], Andrei M. Reinhorn[2], and John B. Mander [3]

Abstract:

The state-of-the-art analysis of concrete masonry shear walls with vertical reinforcement subjected to in-plane lateral loads is similar to that of reinforced concrete shear walls. However, in concrete masonry shear walls reinforced with ungrouted (unbonded) steel bars, the steel strains are dependent on the deformations of the entire wall and not directly related to the deformations of any given section. In general, the inelastic flexural response of concrete members with unbonded reinforcement is dependent on member boundary conditions and loading pattern. Therefore, the ultimate flexural strength cannot be determined by analyzing a single section. An analysis technique for estimating the inelastic flexural behavior of such masonry shear walls with unbonded vertical reinforcement is developed based on a modified fiber model. The procedure is verified with experimental data from cyclic tests. The present paper is intended to provide a rational approach based on force equilibrium and displacement compatibility for evaluation of strength as well as ductility of ungrouted reinforced concrete masonry shear walls. A simple wall configuration with ungrouted reinforcement is evaluated in comparison to grouted reinforced walls. This is the first in a series of papers dealing with the flexural and shear behavior of reinforced and prestressed ungrouted masonry shear walls.

DOI: 10.70803/001c.140456

[1] Graduate Research Assistant
[2] Professor
[3] Associate Professor, Department of Civil Engineering, State University of New York, Buffalo, NY 14260