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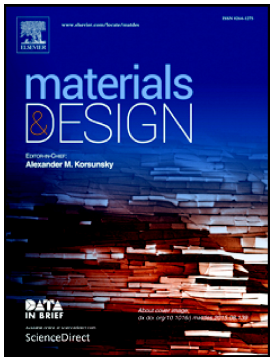

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Shear response of partially-grouted reinforced masonry walls with a central opening: Testing and detailed micro-modelling

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ABSTRACT

Openings can have a significant effect on the seismic response of partially grouted reinforced masonry (PG-RM) walls. Despite this, very few investigations have been carried out to study their influence. Accordingly, this paper presents the results of an experimental and numerical research project aimed at increasing the knowledge of the shear response of PG-RM walls with openings. The experimental program includes test results of three full-scale walls (one solid wall and two perforated walls with a central window) tested under cyclic lateral loading up to failure. In addition, a complete characterization of the constituent materials and their interfaces is reported, with an emphasis on the experimental data needed for implementing advanced numerical models. The results obtained are used to validate a numerical model based on the detailed micro-modelling approach. Once validated, the models are used to conduct a sensitivity analysis that considers opening size variation and the horizontal reinforcement ratio at piers. The results show that a rise in the pier horizontal reinforcement ratio leads to an increase in shear strength and displacement ductility of the entire wall, while an increase in the pier aspect ratio decreases the shear strength and increases the displacement ductility in the entire wall.

Keywords: Reinforced masonry; detailed micro-modelling; shear strength; partially grouted; perforated wall.

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