

EXPERIMENTAL RESEARCH UPON LARGE LIGHTLY-REINFORCED CONCRETE WALLS

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Buildings made up of reinforced-concrete walls represent a structural typology which has been widely used in economic public housing. Such building structures characterised by small wall-thickness (15 - 25 cm) and by small percentage values of steel reinforcement have shown excellent strength resources even against strong earthquake ground motions: the structural over-strength allows to reduce the ductility demand. However, still few experimental and analytical studies have been performed up to now with the aim of evaluating the ultimate (near-collapse) seismic performances of buildings realised using large lightly-reinforced concrete walls.

The research group has recently organised, designed and interpreted (by means of appropriately-developed analytical models capable of capturing the experimental behaviour) a series of experimental tests with cyclic horizontal loading and shaking table tests (conducted at the laboratory of the European Seismic Centre EUCENTRE in Pavia) upon a peculiar typology (with non-returnable block-formwork) of lightly reinforced concrete walls. Due to the peculiar conformation of the block-formwork, the structural wall so-obtained is characterised by the presence of lightening alveolar zones. Inside the blocks, before casting the concrete, appropriate horizontal and vertical reinforcement steel bars are placed, so that the structural walls is actually a reinforced-concrete wall. To obtain an adequate characterisation of the seismic behaviour (stiffness, strength, ductility) of such walls, experimental pseudo-static tests with constant vertical loading and increasing horizontal loading have been carried out both upon single walls and upon a H-shaped 2-storey structural system. The results obtained show a good ductile behaviour, yielding horizontal loads comparable with applied vertical loads, and the maintenance of strength to vertical loads after damaging.

Total number of publications: 20

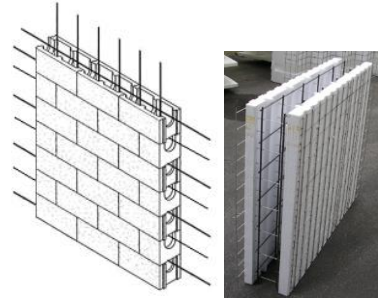


Fig.1 Examples of solutions for reinforced-concrete walls (left: Isotex, right: Trombetti).

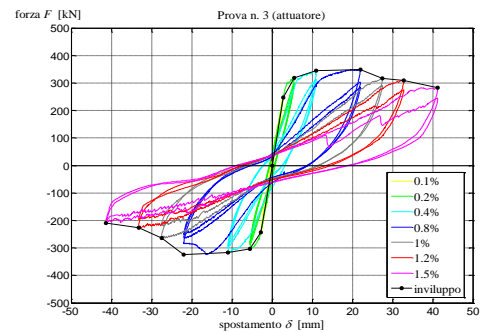


Fig.2 Results of experimental tests with cyclic horizontal loading (Silvestri).



Fig.3 Shaking-table tests upon a full-scale 3-storey building (Silvestri).

MAIN PUBLICATIONS

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pseudo-static tests with cyclic horizontal load on concrete/polystyrene sandwich bearing panels and their analytical counterparts", *Atti "Le Nuove Frontiere del Calcestruzzo Strutturale"*, Università di Salerno - ACI Italy Chapter, 22-23 Aprile 2010.

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RESEARCH PROJECTS

Convenzione C&P Costruzioni - DISTART. Responsabile scientifico: Prof. Claudio Ceccoli.

Convenzione Nidyon Costruzioni - DISTART. Responsabile scientifico: Prof. Claudio Ceccoli.

Progetto di ricerca SERIES (2010-2011): "Seismic behavior of structural systems composed of cast in situ concrete walls", EUCENTRE TREES Lab facility (Pavia, Italy), Lead User: Prof. Salvador Ivorra Chorro, University of Alicante, Responsabile Unità di Bologna: Prof. Tomaso Trombetti.

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