

Correlations Between the Experimental Results of Pseudo-Static Tests with Cyclic Horizontal Load on Concrete/Polystyrene Sandwich Bearing Panels and their analytical counterparts

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Summary

In recent years, the seismic behaviour of reinforced concrete bearing panels structures has been the object of several research works. This paper presents a summary of the results obtained in a wide experimental/analytical/numerical correlation campaign carried out as a joint effort between the University of Bologna and the EUCENTRE labs in Pavia. This effort was devoted at the assessment of the seismic performances of structures composed of (lightly reinforced) concrete/polystyrene sandwich bearing panels. In this paper: (1) the results of a number of pseudo-static tests with cyclic horizontal load have been briefly recalled; (2) extensive analytical developments have been carried out to evaluate the mechanical characteristics and the seismic behaviour of lightly reinforced concrete panels; (3) numerical results have been obtained with advanced analyses on a sophisticated model of the panel; (4) a comparison between the analytical, the numerical and the experimental results has been performed. The comparison shows a good agreement between the experimental results and their analytical counterparts.

Keywords: seismic performances, stiffness; strength; ductility; PBSB; DDBD.

1. Introduction

The study of the seismic behavior of cellular structures composed of squat shear walls has been developed only recently ([1], [2], and [3]) and lies mainly in the study of the in-plane behavior of single traditional reinforced concrete squat walls under cyclic lateral loading. Therefore, in order to comprehend the actual seismic behavior of structures realized with one of these new constructive technologies, a wide experimental campaign carried out as a joint effort between the University of Bologna and the EUCENTRE labs in Pavia was developed.

2. The Construction Technique

The Nidyon Panel is composed of two external 40 mm reinforced concrete walls, cast in situ, and a central 60÷140 mm expanded polystyrene waved layer. This is why such panel is called “sandwich bearing panel/wall”. The internal expanded polystyrene layer just provides high levels of acoustic and thermal insulation.