

Test and analysis of the precast composite RC shear wall

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Summary

In this paper, 9 specimens of precast composite RC shear wall and 3 compared specimens of normal RC wall were tested under low frequency cyclic load to study the structural behaviour of the precast composite RC shear wall and its difference from that of the normal cast-in-place RC wall. By observing the test phenomena and analyzing the test data, it is found that the precast composite RC shear wall has reliable structural behaviour and can be used as structural elements instead of normal cast-in-place RC wall in some cases. Furthermore, the test result also proves that it is reliable to design the precast composite RC wall according to the existing Chinese Design Code.

Keywords: precast composite RC shear wall; cyclic loading test; industrialization of building construction; structural behaviour; shearing capacity.

1. Introduction

Precast concrete craft, with less field workload, energy-saving, less environmental pollution and easier quality control, meets the necessities of sustainable development and is used to increase the industrialization level of the construction of RC building. Recently in Shanghai, a partly precast wall named precast composite RC shear wall is to be used as structural outside walls to construct high-rise RC shear wall buildings. In order to study the reliability and its structural behaviour, 9 prototype specimens of such wall (named as PCFI-A~B) and 3 compared specimens of normal RC wall (named as SWA~B) have been tested under low frequency cyclic load. The effective thickness of the precast composite RC shear wall specimens equalled to the thickness of the compared specimens of normal RC wall.

These 12 specimens were classed into three types as solid walls, walls with an opening or a vertical edge joints. Each specimen of the composite RC wall was composed of two parts, one was the precast concrete form (PCF) made in factory, and the other was the wall plate cast-in-place. Both the PCF and the part cast-in-place were integrated by composite reinforced bar skeleton seen in Fig.1. The design details of these specimens are shown in Fig.2 and Table 1.

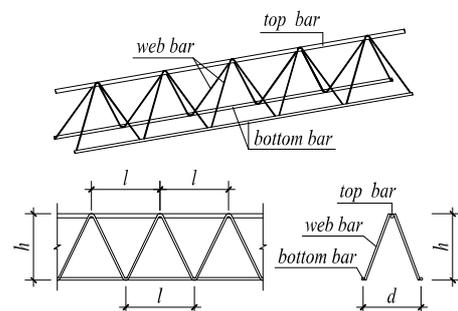


Fig.1: composite reinforced bar skeleton

The test mainly focused on studying the structural behaviour of the precast composite RC shear wall including loading-deformation curves, cracking pattern, failure mode, shearing capacity, ductility, energy dissipation capacity etc. and its difference from that of the normal cast-in-place RC wall. At the same time, the integrity and interaction between PCF and the part cast-in-place of the