

Experimental Investigation on Cold-Formed Steel Foamed Concrete Composite Wall under Compression

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Abstract : A series of tests on cold-formed steel foamed concrete (CSFC) composite walls subjected to axial load were proposed. The primary purpose of the experiments was to study the mechanical behavior and identify the failure modes of CSFC composite walls. Two main factors were considered in this study: 1) specimen with pouring foamed concrete or without and 2) different foamed concrete density ranks (corresponding to different foamed concrete strength). The interior space between two pieces of straw board of the specimen W-2 and W-3 were poured foamed concrete, and the specimen W-1 does not have foamed concrete core. The foamed concrete density rank of the specimen W-2 was A05 grade, and that of the specimen W-3 was A07 grade. Results showed that the failure mode of CSFC composite wall without foamed concrete was distortional buckling of cold-formed steel (CFS) column, and that poured foamed concrete includes the local crushing of foamed concrete and local buckling of CFS column, but the former prior to the later. Compared with CSFC composite wall without foamed concrete, the ultimate bearing capacity of specimens poured A05 grade and A07 grade foamed concrete increased 1.6 times and 2.2 times respectively, and specimen poured foamed concrete had a low vertical deformation. According to these results, the simplified calculation formula for the CSFC wall subjected to axial load was proposed, and the calculated results from this formula are in very good agreement with the test results.

Keywords : cold-formed steel, composite wall, foamed concrete, axial behavior test

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