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Abstract

ANALYTICAL INVESTIGATION OF BLOCK SHEAR OF
COPED BEAMS WITH WELDED CLIP ANGLES
CONNECTION

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In steel construction, double clip angles are often employed to connect the coped beam to the supporting girder. The clip angles can be either bolted or welded to the coped beams. For those coped beams with clip angle connections, block shear failure is a potential failure mode. However, previous research works only focused on the study of the block shear strength of the coped beam with bolted clip angle connection and only relatively few studies have been conducted on welded end connections. Therefore, a research study was initiated to examine analytically the block shear strength of coped beams with a welded clip angles connection. The main objectives of this research program are to systemically investigate the effects of two parameters, namely: the geometry of the web block and the initial rotational stiffness of connections on the block shear capacity of coped beams with welded double clip angles connection by finite element method. Based on tests results of Zhong (2004), nonlinear finite element models were developed using the commercial program ABAQUS 6.4 (2004). The models were validated by the test results and subsequently employed to conduct a parametric study. A total of 94 finite element models were developed in the numerical study. The parametric study results showed that the block shear capacity of coped beam increased with increasing aspect ratio of the web block and the initial rotational

stiffness of connections. The parametric study also revealed the effect of the aspect ratio of the web block and initial rotational stiffness of connections on the stress distribution of the web block, and the effects of the two parameters on the average tensile stress over the tension area and the average shear stress over the shear area were obtained. Consequently, a proposed strength model for evaluating the block shear capacity of coped beams with welded clip angles connection incorporating the effects of both the web block geometry and the initial connection stiffness was developed. In general, the proposed design equation can provide better predictions of block shear capacity of coped beams.