Innovative Steel Pennon Plate-Headed Stud of Shear Connectors for Composite Structures

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Abstract

This study proposes an innovative pennon plate-headed stud of shear connectors. The proposed stud consists of two triangular-shaped steel plates on both sides of the headed stud; it is expected to increase the shear capacity of a steel-concrete composite connection. Nonlinear finite element analysis is carried out using ABAQUS to analyze the response of 54 models of PPH studs. A full factorial design and the analysis of variance are employed in the design of experiments (DOE). The impacts of factors and their interactions, such as the thickness and height of the pennon plates, concrete grades, and stud diameters, are captured by using $3^3 \times 2^1$ DOE with a 5% significance level. The results show that the ultimate shear resistance is increased apparently. Additionally, the concrete grade and stud diameter significantly influence the capacity of the connection. Moreover, connection slip is greatly affected by concrete grade, the height of the plate, and the interaction between plate thickness and height.

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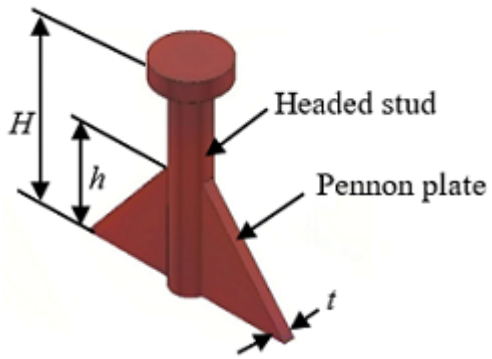

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