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型钢高强高性能混凝土梁抗剪承载力试验研究

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EXPERIMENTAL STUDY ON THE SHEAR CAPACITY OF SRHSHPC BEAMS

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- 摘要
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摘要 基于10榀型钢高强高性能混凝土简支梁的抗剪试验, 揭示了影响梁抗剪性能的主要因素, 得出了剪跨比、混凝土强度、含钢率、配箍率、翼缘宽度比(型钢翼缘宽度和梁截面宽度的比值)和加载方式对梁抗剪承载力的影响规律。依据现有型钢混凝土梁抗剪承载力计算方法, 采用梁构件桁架-拱模型, 分析了型钢高强高性能混凝土梁的受剪机理, 认为其斜截面抗剪承载能力依然主要由箍筋、混凝土和型钢腹板三部分来提供, 并回归出了各部分的抗力系数, 建立了型钢高强高性能混凝土梁斜截面抗剪承载力的计算公式。计算结果与试验结果吻合较好, 表明该文提出的计算公式具有较高的精度, 能客观地反映型钢高强高性能混凝土梁的抗剪性能。研究将为型钢高强高性能混凝土梁的设计计算与工程应用提供理论依据。

关键词: 型钢高强高性能混凝土梁 抗剪承载力 试验研究 桁架-拱模型 抗力系数

Abstract: Based on a shear experiment of 10 SRHSHPC (steel reinforced high-strength and high-performance concrete) simply supported beam specimens, this paper reveals the main factors which affect the beam's shear behaviors and obtains the relationship between the shear bearing capacity and the shear span ratio, concrete strength, steel ratio, stirrup ratio, flange width ratio (the ratio of steel flange width and beam width) and loading modes. According to the existing shear calculation methods of SRC beams, and adopting a truss-arch model for SRC beam member, the shear mechanism of SRHSHPC beams is analyzed, then it is concluded that the diagonal shear bearing capacity of SRHSHPC beams is composed of three parts: the effect of stirrup, concrete and steel web. This paper regresses the resistance coefficients of each part and offers calculating formulas for the diagonal shear bearing capacity of SRHSHPC beams. The calculation results agree well with the test conclusions and it is shown that the proposed formulas own high accurateness and can objectively reflect the shear behaviors of SRHSHPC beams. The research achievements will provide a theoretical support for the design calculation and engineering application of SRHSHPC beams.

Key words: steel reinforced high-strength and high-performance concrete beam shear bearing capacity experimental study truss-arch model resistance coefficient

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