

Hot Spot Stress Analysis and Parametric Study on Rib-To-Deck Welded Connections in Orthotropic Steel Bridge Decks

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Abstract : This paper study the stress variation of the welded joints in the rib-to-deck connection structure, the influence stress of the deck plate and u-rib thickness at different positions. A Finite-element model of orthotropic steel deck structure using solid element and shell element was established in ABAQUS. Under a single wheel load, the static response was analyzed to understand the structural behaviors and examine stress distribution. A parametric study showed that the geometric parameters have a significant effect on the hot spot stress at the weld toe, but has little impact on the stress concentration factor. The increase of the thickness of the deck plate will lead to the decrease of the hot spot stress at the weld toe and the maximum deflection of the deck plate. The surface stresses of the deck plate are significantly larger than those of the rib near the joint in the 80% weld penetration into the u-rib.

Keywords : orthotropic steel bridge deck, rib-to-deck connection, hot spot stress, finite element method, stress distribution

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