



Structural Design and Analysis of Orthotropic Steel-SSDC Composite Deck Used for the Widening of the Songpu Bridge

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Abstract

The old Songpu Bridge was a double-deck railway-highway combined steel truss bridge. In the widening and renovation project of Songpu Bridge, the upper deck, which carries highway traffic, was widened from 12 m to 24.5 m. To achieve an appropriate self-weight and better durability, a kind of orthotropic composite deck was used for the reconstructed upper deck; this deck consists of an 80 mm-thick low-shrinkage high-strength ductile concrete (SSDC) layer and orthotropic steel deck plates. Three types of SSDC materials with different composition and mechanical properties are adopted in regions with different tensile stress levels. The detailed design and key considerations of the composite deck are introduced in this paper. Finite element analysis of the composite deck is carried out, and the models and results are presented.

Keywords: the Songpu Bridge; Steel truss bridge; Widening of bridge; Orthotropic composite deck; Low-shrinkage high-strength ductile concrete.