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Experimental study on the steel-concrete composite girder joint of a single pylon cable-stayed bridge

Hybrid girder cable-stayed bridges have been widely used around the world due to its advantages including the large-span viability of the main span of steel and the counterweight effect of the side span of concrete. In hybrid girder cable-stayed bridges, the steel-concrete composite joint plays an important role in connecting the steel girder with the concrete girder. Therefore, the performance and reliability of the composite joint is of great importance to the safety of the bridge. In order to examine the performance of the steel-concrete composite joint of a hybrid girder cable-stayed bridge with single pylon, a 1:4 scaled model for the joint was fabricated in the laboratory and static test was conducted. The stress distribution and the relative slip between concrete and steel under the combined action of the axial force and bending moment were investigated. The test results showed that the axial force and bending moment in the steel girder can be transferred uniformly through the joint to the concrete girder with the bearing plate and the multiple parallel perfobond ribs. The transverse stress at the composite joint reduces from the center to the two sides. Along the longitudinal direction, the minimum compressive stresses occurred at the steel-concrete composite section rather than the steel or the concrete section of the girder. The findings from the study provide useful information and guidance for the design and construction of steel-concrete composite joints in hybrid girder cable-stayed bridges.

Recent Publications

1. He W, Deng L, Shi H, Cai C S and Yu Y (2017) Novel virtual simply-supported beam method for detecting vehicle speed and axles. *Journal of Bridge Engineering* (ASCE); 22(4): 04016141.
2. Cao J, Shao X, Deng L, Cui J, Gan Y (2017) Static and Fatigue Behavior of Short Headed Studs Embedded in Thin UHPC Layer. *Journal of Bridge Engineering* (ASCE); 22(5): 04017005.

Biography

Lu Deng has obtained his PhD degree in Civil Engineering from Louisiana State University in 2009 and worked as a Research Engineer in the Offshore Structure Division at ExxonMobil for 3 years. He is currently a Full Professor in the College of Civil Engineering at Hunan University. He is an Associate Editor of the ASCE Journal of Bridge Engineering and Guest Editor of ASCE Journal of Aerospace Engineering. His areas of expertise include bridge safety evaluation, bridge fatigue and bridge-vehicle coupled vibration. He has published over 100 technical papers, including more than 40 peer-reviewed journal papers in English.

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