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Study on rotation construction control of a hybrid-girder cable-stayed bridge with single pylon and single cable plane

The structure of hybrid girder cable-stayed bridges with single pylon and single cable plane is very complex, which leads to the difficulty in predicting their structural behavior during construction and operation. In this study, the rotation construction process of such a bridge is analyzed. The bridge under consideration is a highway bridge that crosses the railway and has a main span of 169 m. The ZTQZ-350MN rotating system, which is the largest of its kind that has ever been adopted in the rotation construction of bridges, is adopted for this bridge to avoid the interruption of the railway operation. The structural design for the rotation construction of the bridge, the construction of the steel-concrete hybrid girder, and the mechanical behavior of the rotating parts of the bridge during rotation and its construction control are investigated. The structural behavior of the bridge during the construction process is analyzed using the commercial finite element software Midas/Civil. The displacement and the stress of the main girder are calculated, which then provide useful information for the determination of the line shape and the stress control of the bridge. The dynamic analysis model of the bridge is established and is used to investigate the stresses of the bridge during the accelerated and decelerated rotation process. Based on the analysis results, the threshold value for the acceleration/deceleration rate during the rotation process is determined. The findings from this study provide useful reference for the construction control of hybrid girder cable-stayed bridges with single pylon and single cable plane.

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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