

Yongding River Cable-Stayed Bridge: Spatial behavior of pylon-support system

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Since the construction of the Alamillo Bridge designed by Santiago Calatrava, the inclined pylon has attracted the attention of the architectural and structural engineering community. Recently, the Yongding River Cable-Stayed Bridge (see figure) has been designed in China. The bridge is designed with inclined and torsional steel pylons and steel girders. Each pylon has two piers with different inclinations, causing a significant difference in the stiffness and deformation behavior between the piers. In order to ensure the precision and safety of the pylons in construction, a cylindrical lattice shell support structure comprising circular steel tubes was designed to serve as a temporary support structure in construction. This presentation will highlight the analysis and behavior of this support structure.



The finite element model to analyze the support structure is composed of three-dimensional shell and beam elements to simulate the complicated deformation behavior of the pylons and their temporary supports. The results of the analysis of the pylon and the support system are discussed, showing that the deformations of the bridge pylon can be controlled with high precision during construction. The strength and stability of the support system are also discussed. Recommendations are put forward for constructing the inclined pylon structure based on the analysis results.

Biography: Jiaji Wang is a Ph.D. candidate in the Department of Civil Engineering at Tsinghua University, Beijing, China. He received his B.S. from Tsinghua University. His research interests include simulation and testing of composite shear wall structures, concrete constitutive modelling, and construction simulation. He is currently a visiting Ph.D. student in the Department of Civil and Environmental Engineering at Northeastern University working with Prof. J. Hajjar.