



The Analysis of the Non-Axial Force Connection for the Earth-Anchored Cable-Stayed Bridge

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Abstract

The Danjiangkou Reservoir Bridge is the earth-anchored light composite cable-stayed bridge with the largest span in the world. The non-axial force connection is firstly used in the composite cable-stayed bridge. This connection mainly consists of the support system, outer and inner box girders. Based on the FE analysis, the stress distribution, load path and deformation of the non-axial force connection are discussed. The results show that the load on the outer box girder is transferred to the inner box girder by vertical and horizontal supports, so as to complete the transmission of shear force, bending moment and torsion of the cable-stayed bridge at the mid-span. The non-axial force connection presents effective mechanical performance and structural deformation response, which indicates that this connection can reduce the unfavourable longitudinal deformation of the earth-anchored cable-stayed bridge.

Keywords: the earth-anchored cable-stayed bridge; the non-axial force connection; support system; longitudinal deformation.

1 Introduction

The cable-stayed bridge is one of the most competitive bridges. Since the advantages of the earth-anchored cable-stayed bridge consist of high

stiffness of pylon and earth-anchored cable, larger span, lower side-main span ratio and axial force of the main girder, the earth-anchored cable-stayed bridge shows the priority to be constructed at the wide river, valley and canyon [1]. On the other