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1915 Çanakkale Bridge - Aerodynamic Investigations

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ABSTRACT

With a world record main span length of 2023 m the design of the 1915 Çanakkale Bridge spanning the Çanakkale Strait, Türkiye, warranted an extensive array of aerodynamic investigations carried out for determination of the wind loading and verification of the aerodynamic performance. Also, the paper reviews the development of the design specifications considering the location of the bridge and available meteorological data. The development of the wind tunnel test programme necessary to verify the specifications and obtain input to the bridge design is reviewed and selected key results presented. The wind tunnel tests discussed included section model tests of the bridge girder and towers, full aeroelastic models of the free-standing tower and full bridge in service and section model tests of the hanger cables for clarification of rain / wind and vortex induced vibrations. Concerning flutter stability of the bridge it was found that the twin-box girder design provided a high critical wind speed for onset of flutter linked to the progress of the aerodynamic moment coefficient. Vortex induced vibrations of the hanger cables were found to be less pronounced than proposed by Eurocode whereas rain / wind vibrations were substantially stronger.

Keywords: Design specifications, wind climate, wind loading, aerodynamic stability, wind induced cable oscillations.

1 1915 ÇANAKKALE BRIDGE

The 1915 Çanakkale Bridge is a world record suspension bridge having a main span of 2023 m and side spans of 770 m. The bridge is crossing the Çanakkale Strait, Türkiye, between the towns of Lapseki and Gelibolu. The bridge features a $B = 45.06$ m wide twin-box girder having a 9 m wide