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CFD ANALYSIS OF THE AERODYNAMIC RESPONSE OF A TWIN-BOX DECK CONSIDERING DIFFERENT GAP WIDTHS

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Twin-box bridge decks offer a very good aeroelastic response in terms of flutter stability. Because of this, they are being adopted in some of the most challenging long span bridges recently built such as the Stonecutters or the Xihoumen Bridges. On the other hand, this configuration is particularly prone to vortex induced vibration, since vortices shed from the windward box can impinge on the leeward box causing important oscillations when exciting any of the natural frequencies of the structure. The vortex shedding and the force coefficients of this deck typology are affected by the gap-width between the boxes.

The aim of this work is to study the ability of 2D URANS models to correctly reproduce the effect of the gap width in the force coefficients and the vortex shedding of the static twin-box decks. The numerical results are compared with the experimental data obtained by means of wind tunnel test of a sectional model considering arrangements with different gap-widths.

In has been found that the simulations can reproduce with good accuracy the experimental force coefficients for five different gap widths in the range of angles of attack (-10º, +10º). In the same manner, the Strouhal number agrees well with the experimental data reported in the literature. Finally, the distribution of the mean pressure coefficients around deck configurations, based on the gap width, are also reported and compared with experimental data.