



The behaviour of the Third Bosphorus Bridge related to wind and railway loads.

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Abstract

The Third Bosphorus Bridge is a highly rigid suspended bridge with a main span length of 1'408 m and a total length of 2'260 m located at the north of Istanbul near the Black Sea. The cable system is a combination of stiffening cables (stay system) and classical suspension. The wind loads are very significant, but with the addition of two railway tracks, the effect of the large and combined loads and the runability of trains have to be examined in details.

For the turbulent wind, the dynamic behaviour has been studied in wind tunnel labs at Nantes (France) and Milano (Italy) with sectional and aero-elastic models combined with numerical spectral analyses. The first objectives of the tests were to verify the aerodynamic stability of the deck and to evaluate the wind forces on the deck and on the pylons during both service life and construction stages. To ensure a minimum of traffic interruptions, the efficiency of wind shields has been measured in laboratory. To limit the displacements under the railway traffic, pendular bearings have been chosen.

Keywords: bridge, design, wind, bearing, dynamics, tests

1 Introduction

The third Bosphorus bridge, called Yavuz Sultan Selim Bridge, is a suspension bridge with a main span length of 1'408 m and a total length of 2'260 m located at the north of Istanbul near the Black Sea. As the Brooklyn Bridge, the main span is partially suspended at the pylons by stiffening cables and at the main cables with vertical hangers. The classical vertical suspension with hangers is concentrated at the central part of the

main span, over a length of 792 m, inclusive 2x 250 m of transition zone with two suspension systems: stiffening cables system and hangers system (Fig.1).

The pylons are composed of two inclined concrete shafts (77'000 tons); their tops culminate at 320 m. The deck, located 75 m above the sea, is 5.50 m high and 58 m wide with 4 road lanes in each direction, 2 railway tracks and 2 sidewalks. In the central span, the deck is in steel with an