2D Numerical Simulation of the Fluid-Structure Interaction of Long-Span Bridges

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ABSTRACT

Wind-induced phenomena in flexible structures like long-span bridges involve vortex-induced oscillations, buffeting and flutter. These aeroelastic phenomena are crucial for the design criteria of bridge aerodynamics [1]. In particular, when the flow velocity approaches to the flutter limit the amplitude of vibration increases, growing indefinitely until the structure collapses.

This paper deals with the numerical simulation of the fluid-structure interaction (FSI) between a 2D bridge section and the incident wind in order to determine the flutter limit for the structure. The structure under consideration is the Great Belt East bridge (Denmark) which is one of the largest suspension bridges in the world [2]. The aerodynamic forces on the bridge section subjected to a free stream and the structure response are determined using PETSc-FEM code (www.cimec.org.ar/petscfem). The results are compared with wind-tunnel tests and computational simulations reported in the literature an other well known computational fluid dynamics (CFD) solvers.

REFERENCES

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