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The dependence of vortex shedding on the aeroelastic response of a bluff body MARCEL ILIE, Carleton University — Airflow over a vertical flat plate is investigated as a function of Reynolds number, using Large Eddy Simulation. It is generally known that the structure of the wake, behind a bluff body, exhibits very complex turbulent flow patterns. In many practical applications the bluff bodies are flexible structures and this characteristic enables them to respond to the aerodynamic loads. The fluid-structure interaction phenomenon is of critical importance due to the inheriting danger associated with the vortex induced vibrations. The periodic shedding of vortices may result in significant fluctuating loading on the body. When the shedding frequency is close to one of the characteristic frequencies of the body, the resonant oscillations of the body can be excited, causing damaging instabilities. In the present analysis, the dependence of vortex shedding on the aeroelastic response of a vertical flat plate in cross-flow is investigated. A CFD based algorithm, using Large Eddy Simulation, is developed for the investigation of a strong (two-way) aeroelastic coupling between a subsonic flow and a flexible flat plate. The results of the present analysis indicate that there is a strong fluid-structure coupling. It was observed that the aeroelastic response of the flat plate is a function of Reynolds number. Also, the aeroelastic response of the flat plate influences the vortex shedding.

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