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Numerical simulation of laminar flow past a circular cylinder. (English) Zbl 1168.76305

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Summary: The present paper focuses on the analysis of two- and three-dimensional flow past a circular cylinder in different laminar flow regimes. In this simulation, an implicit pressure-based finite volume method is used for time-accurate computation of incompressible flow using second order accurate convective flux discretisation schemes. The computation results are validated against measurement data for mean surface pressure, skin friction coefficients, the size and strength of the recirculating wake for the steady flow regime and also for the Strouhal frequency of vortex shedding and the mean and RMS amplitude of the fluctuating aerodynamic coefficients for the unsteady periodic flow regime. The complex three dimensional flow structure of the cylinder wake is also reasonably captured by the present prediction procedure.

MSC:

76B10 Jets and cavities, cavitation, free-streamline theory, water-entry problems, airfoil and hydrofoil theory, sloshing

Keywords:

laminar flow; circular cylinder; vortex shedding; unsteady RANS procedure; implicit finite volume method; three-dimensional flow

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