

Unsteady Forced Convection Flow and Heat Transfer Past a Blunt Headed Semi-Circular Cylinder at Low Reynolds Numbers

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Abstract : In the present work, the forced convection heat transfer and fluid flow past an unconfined semi-circular cylinder is investigated. The two-dimensional simulation is employed for Reynolds numbers ranging from $10 \leq Re \leq 200$, employing air ($Pr = 0.71$) as an operating fluid with Newtonian constant physics property. Continuity, momentum, and energy equations with appropriate boundary conditions are solved using the Computational Fluid Dynamics (CFD) solver Ansys Fluent. Various parameters flow such as lift, drag, pressure, skin friction coefficients, Nusselt number, Strouhal number, and vortex strength are calculated. The transition from steady to time-periodic flow occurs between $Re=60$ and 80 . The effect of the Reynolds number on heat transfer is discussed. Finally, a developed correlation of Nusselt and Strouhal numbers is presented.

Keywords : forced convection, semi-circular cylinder, Nusselt number, Prandtl number

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