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Frequency and Symmetry Characteristics of Laminar Vortex Shedding from a Sphere[1] DONGJOO KIM, Kumoh National Institute of Technology — Numerical simulations are conducted for laminar flow past a sphere in order to investigate the variation in the frequency and symmetry characteristics of vortex shedding with respect to the Reynolds number. The Reynolds numbers considered are between 300 and 475, covering unsteady planar-symmetric and unsteady asymmetric flows. Results show that unsteady planar- symmetric flows, where hairpin vortices are periodically shed in a fixed orientation, can be divided into two different regimes: single-frequency regime and multiple-frequency regime. The former has a single frequency due to regular shedding of vortices with the same strength in every shedding cycle, while the latter has multiple frequency components due to cycle-to- cycle variation in the strength of shed vortices. The multiple- frequency planar-symmetric flow, newly found in the present study, occurs at $Re = 340, 350,$ and 360. On the other hand, the asymmetric flow occurs at $Re \geq 365$, where vortices shed from the sphere show variation both in strength and azimuthal angle unlike the planar-symmetric flows. It is also found that the breaking of planar symmetry is closely related to the imbalance of vortical strength between a pair of streamwise vortices.

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