Numerical study of vortex interactions behind two circular cylinders in bistable flow regime

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A two-dimensional discrete-vortex model was used to investigate vortex interaction inside the near wakes of two circular cylinders in side-by-side arrangement within bistable flow regime. Two phases of vortex evolution are mainly identified in the near wakes: a symmetric shedding phase, characterized by two antiphase vortex streets, and a flip-flopping phase, characterized by biased gap flow, switching at irregular intervals. For the flip-flopping phase, vortex amalgamation, vortex pairing and dipole are found. Vortex dynamics of the flow is presented and its possible effects on the flow parameters are discussed. The initiation and transition from the symmetric to flip-flopping phase are caused by the asymmetry of one of the gap vortices. Flow visualization and quantitative results obtained seem to support the findings from the model.

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