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A mathematical model of laminar wakes with four vortices per period SAIKAT BASU, MARK STREMLER, Virginia Tech — Laminar wakes behind vortex-shedding bluff bodies can exhibit a variety of patterns when the bodies oscillate or are in close proximity to one another. In many cases these patterns consist of regular groupings of four vortices. We present a two-dimensional potential flow model that assumes a spatially periodic arrangement of point vortices. This Hamiltonian system is made integrable by imposing an additional spatial symmetry that is motivated by the experimental wakes. The current model generalizes our previous results by allowing for unequal vortex strengths. The model shows a variety of dynamic modes that we classify using a bifurcation analysis of the phase space structure. Some initial conditions lead to relative equilibria in which the vortex configuration moves without change in size or shape. Scaled comparisons of the model with experiments show good results and allow for estimation of the experimental vortex strengths.

Mark Stremler
VIrginia Tech

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