Vortex Dynamics of Wakes

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One of the most spectacular, significant and well studied fluid instabilities is the formation of a vortex wake behind a bluff body. The Kármán-Bénard vortex street will be well known. The presentation will highlight recent work on (i) a physical rationale for the Strouhal-Reynolds number relation for vortex shedding; (ii) the phenomenology of vortex wakes behind an oscillating cylinder and a theory of the Williamson-Roshko bifurcation diagram for such wakes; (iii) some ideas on the vortex structure of "exotic wakes" involving more than two vortices shed per period from the body. Although there are also very interesting three-dimensional effects, we will restrict attention to purely two-dimensional flows where the opportunities for analysis and modeling are greater, and numerical simulations can be done with relative ease.