The Domm System: Vortex Dynamics of wakes VASILEIOS
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Blacksburg, VA 24061, HASSAN AREF[1], Fluid DTU, Technical University of Denmark, Lyngby, DK-2800, Denmark — A significant number of engineering applications involve the dynamics of wakes behind bluff bodies. The dynamical system of
four vortices in a periodic strip, all of the same absolute magnitude, two of either
sign, is considered here. We refer to this as the *Domm system* since Domm was
the first to consider it in 1956. To study the stability and understand the nonlinear
behavior in the vicinity of the vortex street configurations we expose the vortices to
perturbations that preserve momentum and energy. The variables that Domm used
in his analysis provide a canonical transformation from the original vortex coordinates, as is evident from later work by Eckhardt and Aref. In effect, a canonical
reduction of the four-vortex system from four degrees of freedom to two is achieved.
The reduced system still has the Hamiltonian as an integral. Hence, it "lives" in a
three-dimensional space. Our analysis aims to understand the global dynamics of
the system and to relate it to finite-amplitude perturbations of vortex streets and
their dynamics.

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