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Dynamics of Multiple Cylinders in an Inviscid Fluid ANTHONY LEONARD, California Institute of Technology, ANDREW TCHIEU, ETH Zurich — We consider a collection of circular cylinders moving in an unbounded inviscid fluid. The force on one particular cylinder will be determined by the accelerations, velocities, positions, and radii of all cylinders. We approximate this interaction by taking, in the vicinity of a given cylinder, only the first two terms in a Taylor series expansion of the velocity field induced by the remaining cylinders, i.e. the induced velocity at the center of the given cylinder plus the linearized induced strainrate field. We then correct the potential for this field to satisfy the no through-flow constraint on the cylinder in question. Using Bernoulli's equation, we then derive a coupled system of equations for the forces on all the cylinders. As a result, the added masses are computed to order a^2/d^2 and the force coefficients, not dependent on accelerations, are computed to order a^3/d^3, where a is a typical cylinder radius and d is a typical separation distance. An additional correction for close interactions is proposed. Several examples of cylinder dynamics will be presented.

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