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On the Steady Motion of a Coupled System Solid-Liquid

The main topic of this talk is centered around the unconstrained (free) motion of an elastic solid, $\mathcal{B}$, in a Navier-Stokes liquid, $\mathcal{L}$, occupying the whole space outside $\mathcal{B}$, under the assumption that a constant body force is acting on $\mathcal{B}$. More specically, we are interested in the steady motion of the coupled system $\{\mathcal{B}, L\}$, which means that there exists a frame with respect to which the relevant governing equation possess a time-independent solution. We discuss the existence of such a frame and of corresponding steady solutions, and show that they actually exist, provided some smallness restrictions are imposed on the physical parameters, and the reference conguration of $\mathcal{B}$ satises suitable geometric properties. Part of this work is in collaboration with Josef Bemelmans (RWTH Aachen) and Mads Keyd (TU Darmstadt).