Abstract Submitted
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Changes of Kármán vortex shedding from a cylinder due to weak fluid elasticity[1] CHRIS PIPE, PETER MONKEWITZ, EPFL — Experiments on vortex shedding from a cylinder placed in uniform flows of dilute polymer solutions are reported for Reynolds numbers from 50 to 150. The fluids used were aqueous solutions of polyethylene oxide (PEO) and rheological characterization showed them to have a constant viscosity over a wide range of shear rates. Using the Zimm model relaxation time the Deborah numbers calculated for the cylinder wake are $O(10^{-3})$. Parallel vortex shedding was induced with a combination of end-cylinders and end-plates. The resulting nominally two-dimensional cylinder wake was investigated using LDA, PIV, hydrogen bubble visualizations and hot film anemometry. The characteristics of the von Kármán instability - the critical Reynolds number, maximum perturbation amplitudes, etc. - are presented as a function of PEO concentration. It is shown that even small amounts of polymers, corresponding to low Deborah numbers, have a significant stabilizing effect which is only counteracted by shear-thinning at higher concentrations.

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