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Compactness Properties and Existence of Weak Solutions for a Fluid-Structure Interaction Problem

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Abstract: In order to model the behavior of slim structures under wind action, the Stokes equation for the flow motion is coupled to linear elasticity equations. A penalization of the fluid equation in a fictitious domain leads to a weak formulation in the whole domain occupied by the structure and the fluid. Compactness of the operator defined by the bilinear form that describes the structure displacement is used to prove regularity results. Existence of a weak solution is then a consequence of a fixed point theorem and of the existence of weak limits.