Sobolev spaces with noninteger indices and controllability of a propeller

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We consider the problem of controllability of a rotating propeller. We say that a set of initial data of the propeller is controllable if, for any initial data of this set by suitable manipulation of the exterior force, the propeller goes to rest. The main result is a description of controllable sets of initial data. The equation is not strongly hyperbolic. To get exact controllability of such equation in the sharp time interval we use control functions from Sobolev spaces with noninteger indices. To prove our results we apply the method of moments. We use recent results about exponential bases in Sobolev spaces with noninteger indices.

This is joint work with Sergei Avdonin, University of Alaska, Fairbanks.