Fursikov, Andrei Vladimirovich; **Imanuvilov, Oleg Yurievich**

Local exact controllability of the Navier-Stokes equations. (English) Zbl 0873.76020

C. R. Acad. Sci., Paris, Sér. I 323, No. 3, 275-280 (1996).

Summary: Let $\Omega \Subset \mathbb{R}^n$ and $\widehat{u}(t,x)$ be a given solution of the equation $\partial_t u(t,x)+A(u)=f(t,x)$, $t\in(0,T)$, $x\in\Omega$. The equation is called local exact controllable from boundary if for any initial condition $u_0(x)$ belonging to the ε-neighbourhood of the point $\widehat{u}(0,\cdot)$ ($\varepsilon=\varepsilon(\widehat{u})$) there exists such boundary control α that a solution u of the equation supplied with $u|_{(0,T)\times\partial\Omega}=\alpha$, $u|_{t=0}=u_0$ satisfies the condition $u(T,x)\equiv\widehat{u}(T,x)$. The local exact boundary controllability of the two-dimensional and three-dimensional Navier-Stokes as well as Boussinesq equations is established in this paper. For two-dimensional Navier-Stokes equations the same property is established also in the case when the control is defined on a boundary's arbitrary subset. For two-dimensional Euler equations (respectively for Navier-Stokes equations), global exact (respectively approximate) controllability has been shown (with slip boundary conditions for Navier-Stokes equations) by *J.-M. Coron* [C. R. Acad. Sci., Paris, Ser. I 317, No. 3, 271-276 (1993; Zbl 0781.76013)].

MSC:

76D05 Navier-Stokes equations for incompressible viscous fluids
93C20 Control/observation systems governed by partial differential equations
35Q30 Navier-Stokes equations

Keywords:

boundary control; Boussinesq equations