

Zhou, Yong

Regularity criteria in terms of pressure for the 3-D Navier-Stokes equations in a generic domain. (English) [Zbl 1054.35062](#)

Math. Ann. 328, No. 1-2, 173-192 (2004).

The initial boundary value problem is considered in $\Omega \times (0, T)$

$$\begin{aligned} \frac{\partial v}{\partial t} - \Delta v + (v \cdot \nabla)v + \nabla p &= 0, \quad \nabla \cdot v = 0 \quad \text{in } \Omega \times (0, T) \\ v &= 0 \quad \text{on } \partial\Omega \times (0, T) \\ v(x, 0) &= 0 \quad \text{in } \Omega. \end{aligned}$$

Here $\Omega \subset \mathbb{R}^3$ is the half-space \mathbb{R}_+^3 or a bounded domain with smooth boundary, or an exterior domain with smooth boundary.

It is proved that if $v(x, t)$ is a Leray-Hopf weak solution of the problem and $p(x, t)$ or $\nabla p(x, t)$ satisfies to certain conditions of integrability then $v(x, t)$ is a smooth solution in $(0, T)$.

Reviewer: Il'ya Sh. Mogilevskij (Tver)

MSC:

35Q30 Navier-Stokes equations

35B65 Smoothness and regularity of solutions to PDEs

76D03 Existence, uniqueness, and regularity theory for incompressible viscous fluids

Cited in **55** Documents

Keywords:

Navier-Stokes equations; regularity criterion; integrability of pressure

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