

Abels, Helmut; Wiegner, Michael

Resolvent estimates for the Stokes operator on an infinite layer. (English) Zbl 1212.35343

Differ. Integral Equ. 18, No. 10, 1081-1110 (2005).

Summary: In this paper we prove unique solvability of the generalized Stokes resolvent equations in an infinite layer $\Omega = \mathbb{R}^{n-1} \times (-1, 1)$, $n \geq 2$, in L^q Sobolev spaces, $1 < q < \infty$, with nonslip boundary condition $u|_{\partial\Omega} = 0$. The unique solvability is proved for every $\lambda \in \mathbb{C} \setminus (-\infty, -\pi^2/4]$, where $-\frac{\pi^2}{4}$ is the least upper bound of the spectrum of Dirichlet realization of the Laplacian and the Stokes operator in Ω . Moreover, we provide uniform estimates of the solutions for large spectral parameter λ as well as λ close to $-\frac{\pi^2}{4}$. Because of the special geometry of the domain, a partial Fourier transformation is used to calculate the solution explicitly. Then Fourier multiplier theorems are used to estimate the solution operator.

MSC:

[35Q30](#) Navier-Stokes equations

[76D07](#) Stokes and related (Oseen, etc.) flows

Cited in **9** Documents

Keywords:

Stokes operator