

Beirão da Veiga, Hugo

Existence results in Sobolev spaces for a stationary transport equation. (English)

Zbl 0691.35087

Ric. Mat. 36, Suppl., 173-184 (1987).

Let Ω be an open bounded subset of R^n with smooth boundary Γ . Let $v(x)$ denote a smooth vector field always tangential to Γ , $a(x)$ a smooth matrix-valued function. The author considers the equation $\lambda u + (v \cdot \nabla)u + au = f$, where $\lambda > 0$. Given an integer $k \geq -1$ and $p \geq n/(k+2)$, the author proves that for any f in the Sobolev space $W^{k,p}(\Omega)$ there exists a unique solution in the same space, provided λ is large enough. If $k \geq 1$, then it is proved that the solution is zero on Γ if and only if the same is true for f . The paper was motivated by the study of the stationary solution of the compressible heat-conducting Navier-Stokes equations [see the author, Commun. Math. Phys. 109, 229-248 (1987; Zbl 0621.76074)] where an application of the previous result in the case $k = -1$ is given.

Reviewer: P.Secchi

MSC:

35Q99 Partial differential equations of mathematical physics and other areas of application

Cited in **22** Documents

35D05 Existence of generalized solutions of PDE (MSC2000)

35B30 Dependence of solutions to PDEs on initial and/or boundary data and/or on parameters of PDEs

Keywords:

stationary transport equation; Navier-Stokes equations; boundary behavior