Mamontov, A. E.

Global solvability of the multidimensional Navier–Stokes equations of a compressible nonlinear viscous fluid. II. (English. Russian original) Zbl 0928.35119

Sib. Math. J. 40, No. 3, 541-555 (1999); translation from Sib. Mat. Zh. 40, No. 3, 635-649 (1999).

The article is a continuation of the author's study of the multidimensional Navier-Stokes equations. In the first part [see *A. E. Mamontov*, Sib. Mat. Zh. 40, No. 2, 408-420 (1999)], the author stated the problem, announced results, and established the solvability of the stationary problem which is needed for justifying the Rothe method. The choice of this method relates to the necessity of invoking an analog of original differential equations for establishing boundedness of the derivatives with respect to time and, as a consequence, compactness of approximate solutions.

The aim of the second part is to prove solvability of the evolution problem, in particular, for the limit stress tensor. The author constructs a solution to the evolution problem by the Rothe method with parabolic regularization and mollification of the convection terms.

Reviewer: V.Grebenev (Novosibirsk)

MSC:

35Q30	Navier-Stokes equations	Cited in **4** Documents
35D05	Existence of generalized solutions of PDE (MSC2000)	
35B45	A priori estimates in context of PDEs	
46E30	Spaces of measurable functions (L^p-spaces, Orlicz spaces, Köthe function spaces, Lorentz spaces, rearrangement invariant spaces, ideal spaces, etc.)	
35A35	Theoretical approximation in context of PDEs	

Keywords:

multidimensional Navier-Stokes equation; compressible fluid with nonlinear viscosity; weak solution; global solvability

Full Text: DOI

References:

[1] A. E. Mamontov, "Global solvability of the multidimensional Navier-Stokes equations of a compressible fluid with nonlinear viscosity. I," Sibirsk. Mat. Zh.,40, No. 2, 408–420 (1999). · Zbl 0938.35121

[2] J. Simon, "Compact sets in the spaceL p(0,T; B)," Ann. Mat. Pura Appl., (IV)-VCXLVI, 65–96 (1987). · Zbl 0629.46031

[3] R. J. DiPerna and P. L. Lions, "Ordinary differential equations, transport theory and Sobolev spaces," Invent. Math.,98, 511–547 (1989). · Zbl 0696.34049 · doi:10.1007/BF01393835

[4] M. A. Krasnosel'skiî and Ya. B. Rutitskiî, Convex Functions and Orlicz Spaces [in Russian], Fizmatgiz, Moscow (1958).

[5] A. E. Mamontov, Orlicz Spaces in the Existence problem of Global Solutions to Viscous Compressible Nonlinear Fluid Equations [Preprint, No. 2-96], Inst. Gidrodinamiki (Novosibirsk), Novosibirsk (1996).

[6] A. Kufner, S. Fučik and O. John, Function Spaces, Academia, Prague (1977).