3-D flow of a compressible viscous micropolar fluid with cylindrical symmetry: a local existence theorem

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Abstract

In this work we consider the nonstationary 3D flow of a compressible viscous and heat-conducting micropolar fluid, which is in the thermodynamical sense perfect and polytropic. The fluid domain is the subset of $\mathbf{R}^3$ bounded with two coaxial cylinders that present solid thermoinsulated walls. We assume that the initial mass density, temperature, as well as the velocity and microrotation vectors are radially dependent only and analyze the corresponding initial-boundary value problem. With the additional assumption that the initial mass density and temperature are strictly positive we prove that for smooth enough initial data there exists a cylindrically symmetric generalized solution locally in time. The proof is based on the Faedo-Galerkin method.

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