

Global solvability of the one-dimensional Cosserat–Bingham fluid equations

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Abstract

The equations for micropolar Bingham fluid are considered and global existence of a weak solution for pressure driven flows is proved for a one-dimensional boundary-value problem with periodic boundary conditions. In contrast to the classical Bingham fluid, the micropolar Bingham fluid supports local micro-rotations and two types of plug zones. Our approach is different from that of Duvaut–Lions developed for the classical Bingham viscoplastic materials. We do not apply the variational inequality but make use an approximation of the generalized Bingham fluid by a Non-Newtonian fluid with a continuous constitutive law.

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