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Global analysis of the flows of fluids with pressure-dependent viscosities. (English)

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Summary: To describe the flows of fluids over a wide range of pressures, it is necessary to take into account the fact that the viscosity of the fluid depends on the pressure. That the viscosity depends on the pressure has been verified by numerous careful experiments. While the existence of solutions local-in-time to the equations governing the flows of such fluids are available for small, special data and rather unrealistic dependence of the viscosity on the pressure, no global existence results are in place. Our interest here is to establish the existence of weak solutions for spatially periodic three-dimensional flows that are global in time, for a large class of physically meaningful viscosity-pressure relationships.

MSC:

76D03 Existence, uniqueness, and regularity theory for incompressible viscous fluids

Cited in **53** Documents

35Q35 PDEs in connection with fluid mechanics

Keywords:

pressure-dependent viscosities; existence; spatially periodic three-dimensional flows; global in time weak solution

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