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Transient viscoelastic helical flows in pipes of circular and annular cross-section. (English)

Zbl 1014.76004

J. Non-Newton. Fluid Mech. 100, No. 1-3, 115-126 (2001).

Summary: Start-up helical flows for Oldroyd-B and upper-convected Maxwell fluids are studied in straight pipes of circular and annular cross-section. The differential form of constitutive equation leads to partial differential equations which are second-order in space and time. Apart from the condition that the fluid is initially at rest, another initial condition is required to complete the solution process. By comparing results derived from the integral form of the constitutive equation, we show that an appropriate initial condition may be found. Numerical results for start-up rotational flow in pipes of annular cross-section are presented.

MSC:

76A10 Viscoelastic fluids

76U05 General theory of rotating fluids

Cited in **25** Documents

Keywords:

Oldroyd-B fluid; upper-convected Maxwell fluid; helical flows; straight pipes; initial condition; start-up rotational flow; annular cross-section

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