Stability of the interface in two-layer Poiseuille flow

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The linear stability analysis of a two-layer plane Poiseuille flow to disturbances of arbitrary wavelengths using upper convected Maxwell (UCM) model has been investigated. The governing equations is solved numerically using expansions in Chebyshev polynomials and the QR matrix eigenvalue algorithm. According to the varying of fluid densities, viscosities, and elasticities with surface tension at interface, the stability diagrams of the coextrusion process were changed. Moreover, the numerical results by the linear stability analysis were compared to the experiemental results of two-layer flow in the rectangular channel. At the experiments, the stability was determined by the grow/decay ratio of wave disturbance, caused by the sinusoidal extrusion velocity, in the two pairs of viewing glasses.