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Resumo das Comunicações

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Heat Transport in a Internally Weakly Viscoelastic Fluid Flow in Rotation

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We consider a weakly viscoelastic flow in a rotating straight duct about a perpendicular axis to the longitudinal direction. The longitudinal aspect ratio is infinite when there exist a difference of temperature on the vertical walls of the transversal cross section.

Numerical simulations of pressure-driven laminar flows in straight ducts of rectangular cross section, rotating with a constant angular velocity are presented. The full nonlinear continuity, momentum and energy equations for a weakly viscoelastic incompressible fluid in primitive variables are solved with a Neumann boundary condition for the pressure. This furnishes a velocity-pressure algorithm which is solved in a cross-section of the duct for a longitudinal gradient of the pressure uncoupled with the transversal one. Results of the temperature transport as effect of the secondary flow rised by the rotation are presented for a uniform difference of temperature at the walls. It is assumed that the cross section of the duct has two types of aspect ratio, 2:1 and 8:1.

We use a central diferences scheme on a staggered grid, second order for the spatial discretization and first order explicit forward time integration, for predicting the secondary velocity, pressure and temperature fields; the results are presented for a range of variation of the parameters: Rossby and Weissenberg numbers.

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