Beneš, Luděk; **Louda, Petr**; **Kozel, Karel**; **Keslerová, Radka**; **Štigler, Jaroslav**
Numerical simulations of flow through channels with T-junction. (English) Zbl 1426.76099
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Summary: The paper deals with numerical solution of laminar and turbulent flows of Newtonian and non-Newtonian fluids in branched channels with two outlets. Mathematical model of the flow is based on the Reynolds averaged Navier-Stokes equations for the incompressible fluid. In the turbulent case, the closure of the system of equations is achieved by the explicit algebraic Reynolds stress (EARSM) turbulence model. Generalized non-Newtonian fluids are described by the power-law model. The governing equations are solved by cell-centered finite volume schemes with the artificial compressibility method; dual time scheme is applied for unsteady simulations. Channels considered in presented calculations are of constant square or circular cross-sections. Numerical results for laminar flow of non-Newtonian fluid are presented. Further, turbulent flow through channels with perpendicular branch is simulated. Possible methods for setting the flow rate are discussed and numerical results presented for two flow rates in the branch.

MSC:

76D05 Navier-Stokes equations for incompressible viscous fluids
76A05 Non-Newtonian fluids
76F10 Shear flows and turbulence
76M12 Finite volume methods applied to problems in fluid mechanics

Keywords:

channel flow; branched channel; EARSM turbulence model; non-Newtonian fluids

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