Numerical Modelling of Incompressible Flows for Newtonian and Non-Newtonian Fluids

Radka Keslerová, David Trdlička, Hynek Řezníček
Czech Technical University in Prague, Faculty of Mechanical Engineering, Department of Technical Mathematics
radka.keslerova@fs.cvut.cz, david.trdlicka@fs.cvut.cz, hynek.reznicek@fs.cvut.cz

Abstract

Branching of pipes occurs in many technical or biological applications. In biomedical applications, it is the complex branching system of blood vessels in human body. The blood can be characterized by shear-thinning viscoelastic property.

The aim of this paper is to describe and discuss the results of numerical simulation of steady and unsteady fluids flow. The governing system of equations is the system of generalized Navier-Stokes equations.

Numerical tests are performed on three dimensional geometry, a branched channel with one entrance and two output parts. Numerical solution of the described models is based on cell-centered finite volume method using explicit Runge–Kutta time integration. Steady state solution is achieved for $t \to \infty$. In this case the artificial compressibility method can be applied. In the case of unsteady computation an artificial compressibility method is considered.

References

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