Kinematic splitting algorithm for fluid-structure interaction in hemodynamics

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The kinematic splitting algorithm belongs to the class of loosely-coupled fluid-structure interaction schemes. We will present stability analysis for a coupled problem of non-Newtonian shear-dependent fluids in moving domains with viscoelastic boundaries. Fluid flow is described by the conservation laws with nonlinearities in convective and diffusive terms. For simplicity of presentation the structure is modelled by the generalized string equation, but the results may be generalized to more complex models. For example, we also present the application of kinematic splitting algorithm applied to three-dimensional viscous incompressible fluid interacting with a thin flexible viscoelastic structure located on one part of the fluid boundary. The arbitrary Lagrangian-Eulerian approach is used in order to take into account moving computational domain. Numerical experiments including numerical error analysis and comparison of hemodynamic parameters for Newtonian and non-Newtonian fluids demonstrate reliability of the proposed scheme, see [1].

References

[1] *M. Lukáčová-Medviďová, G. Rusnáková, A. Hundertmark-Zaušková*: Kinematic splitting algorithm for fluid-structure interaction in hemodynamics. Accepted to Comput. Methods Appl. Mech. Eng. (2013).