# Numerical investigation of steady incompressible fluid flow through a branched channel

Anna Lancmanová

Department of Mathematics, Faculty of Mechanical Engineering
Czech Technical University in Prague, Czech Republic
`anna.lancmanova@fs.cvut.cz`

This contribution presents some of the latest results of a newly developed simple numerical solver aimed to study the flow properties and behavior in branching channels. Our finite difference solver is based on a simple implementation of an immersed boundary method to represent channel geometry. This solver is compared with outputs of an older finite volume code working on classical wall fitted structured multi-block grid. The ultimate aim of our work is to use the simple code for implementation and evaluation of various boundary conditions and model extensions to be later implemented into other more complex solvers. The first numerical results show that the developed code, despite of its simplicity, is able to provide reliable and consistent results for various branching channels configurations.

*This is a joint work with Tomáš Bodnár and Radka Keslerová from Czech Technical University in Prague.*

## References

[1] J.D. Anderson: *Computational Fluid Dynamics - The Basics with Applications.* McGraw-Hill, 1995.

[2] C. Hirsch: *Numerical computation of internal and external flows*, volume 1,2. John Willey & Sons, 1988.

[3] A. Lancmanová and T. Bodnár  Steady incompressible flow through a branched channel. In T. Bodnár, T. Neustupa, and D. Šimurda, editors, *Proceedings Topical Problems of Fluid Mechanics 2021*, pages 87–94. Institute of Thermomechanics CAS, 2021.

[4] A. Lancmanová and T. Bodnár and R. Keslerová. Numerical validation of a simple immersed boundary solver for branched channels simulations. In D. Šimurda and T. Bodnár, editors, *Proceedings Topical Problems of Fluid Mechanics 2022*, Institute of Thermomechanics CAS, 2021.

[5] T. Bodnár and A. Lancmanová and R. Keslerová. Numerical Investigation of Incompressible Fluid Flow in Planar Branching Channels. Recent Advances in Mechanics and Fluid Structure Interaction with Applications: The Bong Jae Chung Memorial Volume. Springer, 2022.