

# Towards Patient-Individual Blood Flow Simulations based on PC-MRI Measurements

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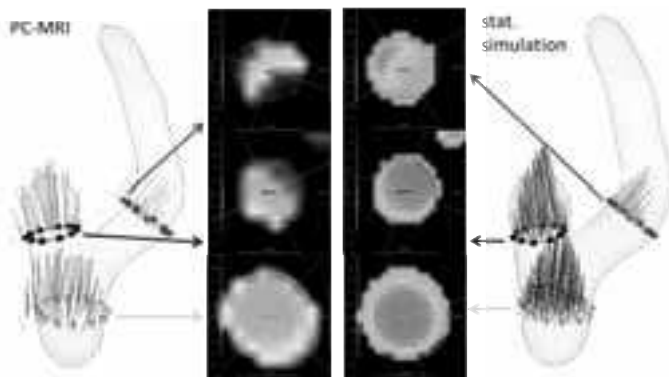


Figure 1: Comparison of simulated systolic velocity profiles in left carotid artery with PC-MRI measurements.

**Abstract:** Computational haemodynamics based on CT or MRI tomographic scans of individual patient vessel anatomy can be a valuable tool for therapy decision in cardiovascular and cerebrovascular diseases. Current approaches are promising, but still suffer from complex model generation, poor knowledge of haemodynamical parameters and high computational costs. We present a new approach of constructing patient-individual flow models that is based on additional knowledge from 4D PC-MRI data, and on the Lattice- Boltzmann method (LBM) as an alternative flow solver. It potentially allows for easier assembling of models, improved accuracy and faster computations by massive parallelization. In this paper, we verify our method for a stenotic flow phantom by comparison with an established CFD solver, and we test the method in order to simulate systolic flow in a carotid bifurcation. Figure 1 shows a comparison of a stationary LBM simulation of the systolic phase with the 4D PC-MRI flow data. The results show good agreement of the primary flow behavior and the velocity magnitudes.