Domain-Decomposition-Based Fluid Structure Interaction Methods using Nonlinear Anisotropic Arterial Wall Models

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Stress distributions in walls of in vivo arteries (transmural stresses) are a major factor driving, e.g., the processes of arteriosclerosis and arteriogenesis which are well-known to be of a major relevance to the human health. Our attention is on fluid- structure interaction using sophisticated nonlinear structural models. Such models have been developed in the past and their parameters have been adapted to experimental data. Here, we use an anisotropic, polyconvex hyperelastic material model [1] for the structure. The resulting coupled problems are solved using a monolithic approach [2] based on Domain Decomposition algorithms, more precisely Overlapping Schwarz and Dirichlet-Neumann. Our project is based on a solver environment coupling the finite element software packages FEAP [4], the library LifeV [3] as well as parallel domain decomposition preconditioners using fully nonlinear models for the fluid and a fully nonlinear, polyconvex, anisotropic model for the structure.

References

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