VESSELS' COMPLIANCE ESTIMATION BASED ON A CONTROL APPROACH APPLIED TO MEDICAL IMAGES AND FSI PROBLEMS

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ABSTRACT

Estimation of model parameters is an issue of fundamental importance in several applications. In this work we are interested in retrieving the compliance (Young modulus) of vessels from measurements of the wall displacement. We propose to estimate this parameter solving a PDE constrained optimization problem; in this case the constraint consists in the Fluid Structure Interaction coupled system. A similar approach for the prescription of defective boundary data has been proposed in [1].
In particular, we assume that our measurements have been processed by means of a registration technique, so that the displacement is available at specific instants. We minimize the difference between the data and the computed displacement subject to a fluid structure interaction model using the Young modulus as control variable; specifically, the fluid is modeled by the Navier-Stokes equations, and the structure by the linear elasticity laws. The interaction between fluid and structure is managed by an Arbitrary Eulerian-Lagrangian approach (see [2]). We present numerical results focused on the investigation of the convergence of the proposed approach in terms of approximation error with respect to a reference solution both with noisy and non-noisy data.

REFERENCES

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