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Inverse problems for the Cardiac System

Abstract:

When considering the modeling of the cardiovascular system and more specifically the heart, there is a need for the personalization of not only the geometry but various aspects of the physical model: uncertain initial conditions, constitutive parameters or boundary conditions. Indeed, identifying key parameters -- using measurements of a type that is available in medical imaging -- can provide patient specific simulations that can be used by clinicians in their diagnosis. In other engineering fields where large amounts of data are available -- like weather forecasting or climatology-- it is now common to tackle these uncertainties in the models by data assimilation procedures -- variational (4D-var) or sequential (Kalman like). In this context, our objective is to propose data assimilation methods adapted to the specificity of the biomechanical systems considered and to the available data, in particular image sequences.

Bio:

P. Moireau is a researcher at Inria, in secondment from Corps des Mines, deputy team leader of M3DISIM (an Inria project-team, joint with the LMS, Ecole Polytechnique). He has obtained his PhD in December 2008 from Ecole Polytechnique in Applied Mathematics on the subject " Filtering based data assimilation for second order hyperbolic PDEs - Applications in cardiac mechanics" and under the supervision of D. Chapelle and P. Le Tallec. Then he spent a year as a Post-Doc in Charles Taylor's Cardiovascular group at Stanford before being recruited in secondment at Inria. His main research concerns inverse problems, in particular identification problems or data assimilation problems in general, with applications to the cardiovascular system.

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