On shape optimization with parabolic state equation

FS: Discretization of optimal control problems

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The present talk is concerned with the numerical solution of shape identification problems for the heat equation. Namely, we aim at the determination of inclusions or voids from measurements of the temperature and the heat flux at the boundary. The particular shape identification problem is reformulated as a shape optimization problem. Then, the shape gradient is computed by means of the adjoint method. A gradient based nonlinear Ritz-Galerkin scheme is applied to discretize the shape optimization problem. The states and their adjoint equations are expressed as parabolic boundary integral equations and solved using a Nyström discretization and a space-time fast multipole method for the rapid evaluation of thermal potentials. Special quadrature rules are derived to handle singularities of the kernel and the solution. Numerical experiments are carried out to demonstrate the feasibility and scope of the present approach.

References:


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