27th IFIP TC7 Conference 2015 on System Modelling and Optimization

Modelling and Control in Contact Mechanics

Numerical Fixed-domain Approaches to PDE-constrained Shape Optimization with Objective Functionals Concentrated on the Boundary of the Unknown Shape

Peter Philip

Ludwig-Maximilians University, Munich, Germany

philip@math.lmu.de

Abstract: Fixed domain techniques using penalization and regularization have successfully been applied in the numerical treatment of PDE-constrained shape optimization. However, objective functionals concentrated on the boundary present considerable difficulties. We present a new approach founded on ODE-based boundary representations and employing the directional derivative of the boundary functional. This approach will be compared with a stochastic method, where descent directions are generated randomly. Numerical results illustrating and assessing both methods will be presented.