Universität
Konstanz

Oberseminar of Numerical Optimization

We kindly invite you to the following talk

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Cut Finite Element Method and Its Application in Shape Optimization

Tuesday, 13 July 2021

Begin: **4:00 p.m.**
Room: **Zoom-Link: https://zoom.us/j/99085685058?pwd=bEZrV0FoaDdFVHdCOFRZOUNBeHVzQT09**
Interested visitors are warmly welcome!

Abstract:
In this talk, we will firstly give a brief introduction to cut finite element methods (CutFEM). The motivation of CutFEM is to circumvent the meshing and remising procedure which is computational costive and challenging for (time dependent) problems with (moving) complex domain and interfaces. Moreover, the optimal accuracy of the method is guaranteed by enriching certain penalty terms.

The remaining of the talk will focus on the application of CutFEM to an inverse free boundary Bernoulli problem. Note that the general framework can be extended to other shape optimization problems. The currently considered severely ill-posed inverse problem takes the form where only the Dirichlet condition is given on the free (unknown) boundary, whereas both Dirichlet and Neumann conditions are available on the fixed (known) boundary. We follow the classical shape optimization method in which a shape dependent cost functional is minimized among the set of admissible domains. The position of domain is represented implicitly by the level set function. The steepest descent gradient (shape derivative) method is applied for the level set evolution. CutFEM is involved to solve the PDE system arisen in the optimization analysis.

This talk is accessible to graduate students.

This is a joint work with Erik Burman (University College London) and Mats G. Larson (Umea University).

(invited by Prof. Dr. Stefan Volkwein)