Karlsruher PDE-Seminar

Improved trial methods for a class of generalized Bernoulli problems

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The trial method is a fixed point type method to compute the solution of free boundary problems. We analyze such trial methods for the solution in case of a generalized exterior Bernoulli free boundary problem with the aim of improving its convergence. At the free boundary, we prescribe either Neumann or Dirichlet boundary conditions and update the free boundary with the help of the remaining Dirichlet or Neumann boundary condition. Appropriate update rules are obtained by expanding the boundary data at the actual boundary via a Taylor expansion of first and second order. With the help of shape sensitivity analysis and Banachs fixed-point theorem, we shed light on the convergence of the respective trial method. We verify linear convergence and are able to stabilize the update rule in case of a prescribed Dirichlet boundary condition. A second order convergent trial method is obtained by means of an inexact Newton method which involves the shape derivative. The feasibility of the proposed trial methods and their performance is demonstrated by numerical results.

Termin: Donnerstag, 20. November 2014, 17:30 Uhr
Ort: 1C-03, Allianz-Gebäude 05.20
Gastgeber: Die Dozenten des Schwerpunkts Partielle Differentialgleichungen