A new Approach to Implicit Systems and Applications in Shape Optimization

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Abstract: Implicit representations of domains are at the core of fixed domain methods in shape optimization, like the fictitious domain approach. When the governing equation has Dirichlet boundary conditions, there are already known results in this respect. In the case of Neumann boundary conditions or of boundary observation, a more detailed knowledge of the properties of the unknown (implicitly defined) boundaries is necessary. We shall present a new approach based on implicit parametrizations of the boundaries. It also allows the handling of the critical case via the generalized solutions. We consider a class of variations of the unknown shapes, called functional variations, similar to the Dirichlet case and show how to compute directional derivatives of the unknown geometry.

References:

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