A Non-Iterative Shape Reconstruction of an Interface from Boundary Measurement

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Abstract : In this paper, we study the inverse problem of reconstructing an interior interface D appearing in the elliptic partial differential equation: $\Delta u + \chi(D)u = 0$ from the knowledge of the boundary measurements. This problem arises from a semiconductor transistor model. We propose a new shape reconstruction procedure that is based on the Kohn-Vogelius formulation and the topological sensitivity method. The inverse problem is formulated as a topology optimization one. A topological sensitivity analysis is derived from a function. The unknown subdomain D is reconstructed using a level-set curve of the topological gradient. Finally, we give several examples to show the viability of our proposed method.
Keywords : inverse problem, topological optimization, topological gradient, Kohn-Vogelius formulation