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Topological and shape optimization methods for inverse shape reconstruction in elliptic PDEs

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This talk focuses on inverse shape reconstruction problems governed by elliptic partial differential equations, where the goal is to recover unknown inclusions characterized by discontinuous coefficients from boundary measurements. The numerical inversion strategy depends on the size and geometry of the inclusions and is based on topological sensitivity analysis and shape optimization. We present efficient reconstruction algorithms, discuss their implementation, and illustrate their performance through numerical examples.

Part of this talk is based on joint work with L. Afraites (Université Sultan Moulay Slimane, Morocco), A. Hadri (Université Ibn Zohr, Morocco), M. Hrizi (Université de Monastir, Tunisia), and H. Kahlaoui (Université de Tunis el Manar, Tunisia).

Keywords: Geometric inverse problems, topological sensitivity analysis, shape optimization, interface reconstruction

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