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TOPOLOGICAL SENSITIVITY ANALYSIS: THEORY AND APPLICATIONS

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Abstract. The topological derivative is defined as the first term (correction) of the asymptotic expansion of a given shape functional with respect to a small parameter that measures the size of singular domain perturbations, such as holes, inclusions, defects, source-terms and cracks (Novotny A.A. and Sokolowski J., *Topological Derivatives in Shape Optimization.* Interaction of Mechanics and Mathematics Series. Springer, 2013). This relatively new concept has applications in many different fields such as shape and topology optimization, inverse problems, imaging processing, multi-scale material design and mechanical modeling including damage and fracture evolution phenomena. In this talk, the topological derivative concept is presented, together with a portfolio of applications in the context of topology optimization, inverse problems and fracture mechanics.