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Level sets in inverse problems and optimization II.

In this talk we extend the concepts introduced in the talk by M. Burger (same title, part I): Based on shape sensitivity analysis, the main focus of this talk will be on shape-gradient-related descent methods and shape-Newton methods in shape optimization. Basic concepts, critical nonlinearities as well as difficulties, and the numerical realization will be addressed. The numerical practice will be highlighted by means of image segmentation based on edge detectors as well as the Mumford-Shah paradigm.

Then, in a second part of the talk, the use of topological sensitivity information in the context of shape as well as topology optimization is discussed. Besides analytical aspects and a phase I (topology) – phase II (shape) algorithmic concept numerical results for imaging problems will be presented. (Received September 26, 2005)