

## **A geometry-based approach for ROI tomography**

Esther Klann

Department of Mathematics, TU Berlin, Germany

E-mail: [klann@math.tu-berlin.de](mailto:klann@math.tu-berlin.de)

In inverse problems one wants to find unknown parameters or structures by indirect measurements. A typical inverse problem occurs in tomographic imaging. The task is to find the inner structure of an object, e.g., a human torso, from line integrals of some form of radiation that travelled through the object. In geometric inverse problems one wants to recover this inner structure also in terms of geometric information, i.e., the number of different interior objects (bone, liver, lung, etc.), their location and their shape. We present a Mumford-Shah type functional for the simultaneous reconstruction and segmentation of an object from tomography data. The minimization of the functional is realized using shape sensitivity analysis and carried out in the level-set framework. We show reconstructions and/or segmentations for simulated region of interest data. We also present a brief overview of some theoretical results on the solvability of the ROI reconstruction problem.