ABSTRACT for POSTER presentation at AIP 2005

Novel evolution strategies for th e solution of 3D shape inverse problems in medical imaging with light.

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Abstract:

In medical imaging typically the problem arises that spatially varying parameters of a given PDE need to be reconstructed from indirect physical measureme the fields. For example, in diffuse optical tomography and in fluor tomography the absorption and the scattering parameter of a transport equation (or a simplified diffusion equation) are sought for imaging parts of t body. Designing efficient reconstruction schemes, which can be applie stable way to 3D data, still proposes great computational difficulties and mathematical challenges to the practitioner. We present novel reconstruction schemes, which have the goal to finally yield fully 3D reconstruction (possibly small) set of 3D data. For this purpose we use the assumption unknown objects can be characterized as shapes with a well-defined possibly only approximately known) parameter contrast to the kno background distribution. These techniques start with an initial guess of the shape and define a shape evolution for solving the inverse problem. Dur evolution, the shapes are constrained to stay in a certain class of shape present numerical examples in 2D and in 3D, which demonstrate t performance of these techniques.