Three-dimensional Level Set Algorithm for Shape Reconstruction of Conducting Objects

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In recent years, the level set methods have received a growing attention for inverse scattering and shape reconstruction problems. This is due to the fact that they are topologically flexible where the breaking and merging of regions are handled automatically with minimum *a priori* required information. The main idea of the level set method is to represent the evolving interface which is a contour in two-dimensional case and a surface in three-dimensional case as the zero level of a higher order function.
Several papers in the literature demonstrated the reconstruction of two-dimensional conducting or dielectric objects using the level-set.

The goal of this work is to implement the level set algorithm for reconstruction of three-dimensional conducting objects. For tracking the surface of evolving objects, a function of three variables will be updated in the computational domain. The level-set function will be initialized to the signed distance function corresponding to the initial guess of unknown 3D objects. The forward scattering problem should be solved to calculate the direction of evolving objects. An appropriate form of deformation velocity, which makes a decreasing cost function, will be used to propagate the objects. The deformation velocity depends on forward and *adjoint* fields. However, instead of integration over contours, the forward and *adjoint* field will be integrated on the surface of objects. The Method of Moments (MOM) will be used to solve the forward scattering problem during the evolution.
Numerical results demonstrating the shape reconstruction of 3D conducting objects will be presented in the conference.