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Abstract

Computational aspects of EIT in cylindrical geometry

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EIT has been used in many medical and industrial applications where the targets are three-dimensional. Therefore also the potential and current distributions are three-dimensional, and numerical approximations of the models that connect the conductivity distribution, the electrical potentials and the current distributions include thousands of unknown parameters that have to be determined. However, if the shape of the target is regular, the computations can be simplified. For example if the target is symmetric along one axis the potentials can be considered as separable functions that are composed of two-dimensional and one-dimensional parts. This can be utilized for example when the potentials are applied for the recovery of the conductivity on the boundary from the Dirichlet-to-Neumann map [1]. Further, it is also possible to take advantage of cylindrical symmetry and separability in a case that the domain extends almost to infinity in one direction so that the potentials and the currents far from the current carrying electrodes are diminished along that axis close to zero. When finite element-based approach is applied for reconstructing three-dimensional conductivity distributions, simple one dimensional infinite elements can be used in the direction where the domain in assumed to be unbounded [2].

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