Identification of a combination of monopolar and dipolar sources in the inverse source problem in EEG

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Absract:

Inverse problems are very important in science, engineering and bioengineering. Among these, inverse source problems have attracted great attention from many researchers over recent years because of their applications to many practical examples, in particular, to electroencephalography (EEG). The inverse source problem in our concern is to identify the source term F in the elliptic equation

$$-\nabla \cdot (\gamma \nabla u) = F \quad \text{in } \Omega$$

using the Cauchy data $\gamma \frac{\partial u}{\partial \nu} = \psi$ and $u|_{\partial\Omega} = \sigma$ on $\Gamma = \partial\Omega$.

In fact, in this lecture, we are going to consider the following type of sources

$$F = \sum_{k=1}^{m_1} \lambda_k \delta_{\alpha_k} + \sum_{k=1}^{m_2} p_k \cdot \nabla \delta_{\beta_k}$$

which is a linear combination of monopolar souces and dipolar souces. An algebraic algorithm, which is noniterative, will be provided to identify the number $m_1 + m_2$ of poles, the location α_k , β_k and their moments λ_k, p_k. This result improves and generalizes the those in [1-2] and [5-7] in which they considered a special type of sources. More details will be seen in the paper [3].

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