Solving the magnetoencephalography inverse problem with particle filters.

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Abstract

The magnetoencephalography (MEG) inverse problem requires to recover the time-varying neural current distribution which is responsible for the measured magnetic fields. If the neural generators are assumed to be point-wise currents, the problem is strongly non-linear. It has been recently suggested that the class of sequential Monte Carlo methods known as particle filters may provide effective algorithms for solving such a problem with minimum a priori assumptions.

Our group is currently working at developing particle filters for MEG. Here we present a brief review of the good theoretical properties of the method; we show that it allows dynamically estimating from the data (i) the number of active sources, (ii) the source parameters and (iii) the reliability of the source parameters; we discuss some applications to both synthetic and real MEG data, and some comparison with other MEG source estimation methods.