Abstract Submitted
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Fully Complex Magnetoencephalography[1] JONATHAN SIMON, YADONG WANG, University of Maryland — Complex numbers appear naturally in biology whenever a system can be analyzed in the frequency domain, such as physiological data from magnetoencephalography (MEG). For example, the MEG steady state response to a modulated auditory stimulus generates a complex magnetic field measurement at each MEG channel, equal to the response's Fourier transform at the stimulus modulation frequency. The complex nature of these data sets, often not taken advantage of, is fully exploited here with new methods. Whole-head, complex magnetic data can be used to estimate complex neural current sources, and standard methods of source estimation naturally generalize for complex sources. We show that a general complex neural vector source, e.g. a current dipole, is described by its location, magnitude, and direction, but also by a phase and by an additional two-dimensional perpendicular component. We give natural interpretations of all the parameters for the complex equivalent-current dipole by linking them to the underlying neurophysiology. We demonstrate biologically generated complex magnetic fields, and their equivalent fully complex current sources, with both simulations and experimental data.

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