

Lead Field Basis for FEM Source Localization

*David Weinstein, Leonid Zhukov,
Chris Johnson
Email: dmw@cs.utah.edu,
zhukov@cs.utah.edu, crj@cs.utah.edu*

UUCS-99-014

Center for Scientific Computing and Imaging
Department of Computer Science
University of Utah
Salt Lake City, UT 84112 USA

October 5, 1999

Abstract

In recent years, significant progress has been made in the area of EEG/MEG source imaging. Source imaging on simple spherical models has become increasingly efficient, with consistently reported accuracy of within 5mm. In contrast, source localization on realistic head models remains slow, with sub-centimeter accuracy being the exception rather than the norm. A primary reason for this discrepancy is that most source imaging techniques are based on lead-fields. While the lead-field for simplified geometries can be easily computed analytically, an efficient method for computing realistic domain lead-fields has, until now, remained elusive. In this paper, we propose two efficient methods for computing realistic EEG lead-field bases: the first is element-oriented, and the second is node-oriented. We compare these two bases, discuss how they can be used to apply recent source imaging methods to realistic models, and report timings for constructing the bases.