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"Theoretical Comparative Evaluation of Sensor Arrays for Magnetostatic Linear Inverse Problems"

Abstract:

Magnetostatic linear inverse problems based on the measurement of magnetic fields arise in a variety of applications, e.g. magneto fluid dynamics, current measurement in multistrands superconducting cables, non-destructive testing, magnetic fields characterization, reconstruction of a magnetization distribution or of the electrical activity in the brain or in the heart.

These problems may be overdetermined (i.e. the number of measurements is higher than the number of unknown parameters) or underdetermined and ill posed. The solution is commonly obtained with the help of regularization.

An important question which arises in practical applications is where magnetic sensors must be located and how many are required. In particular often it is also the case one has to choose between existing or predefined magnetic sensor arrays. It is hence important to define theoretical criteria to compare sensor arrays efficiency for this kind of problems.

Short biography:

Luca Di Rienzo was born in Foggia, Italy, in 1971. He received the Laurea degree in Electrical Engineering in 1996 and the Ph. D. degree in electrical engineering in 2001, both from Politecnico di Milano.

Currently, he is assistant professor of electrical engineering with the Dipartimento di Elettrotecnica of Politecnico di Milano. At present, his research interests are in the field of computational electromagnetics and include magnetic inverse problems and surface impedance boundary conditions. He is also involved in electromagnetic compatibility problems using commercial software packages.

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Recent publications:

C. M. Arturi, L. Di Rienzo, J. Haueisen, "Information Content in Single-Component Versus Three-Component Cardiomagnetic Fields", IEEE Transactions on Magnetism, Vol. 40, No. 2, 2004, pp. 631-634.

L. Di Rienzo, J. Haueisen, C. M. Arturi, "Three component magnetic field data Impact on minimum norm solutions in a biomedical application", COMPEL, Int J for Computation and Maths. in Electrical and Electronic Eng., Vol. 24, No. 3, 2005, pp. 869-881 (13).

L. Di Rienzo, J. Haueisen, "Theoretical Lower Error Bound for Comparative Evaluation of Sensor Arrays in Magnetostatic Linear Inverse Problems", IEEE Transactions on Magnetism, Vol- 42, No. 11, 2006, pp. 3669-3673.

Organizers: University of Zagreb, Faculty of Electrical Engineering and Computing, Faculty of Science, Physics Department, Croatian Medical and Biological Engineering Society and Croatian Biophysical Society.