**Electronic Transactions on Numerical Analysis.**
**Volume 25, pp. 41-53, 2006.**

**ISSN 1068-9613.**

**ETNA**
**Kent State University**
**etna@mcs.kent.edu**

# INVERSE SOURCE PROBLEM IN A 3D BALL FROM BEST MEROMORPHIC APPROXIMATION ON 2D SLICES*

L. BARATCHART†, J. LEBLOND†, AND J.-P. MARMORAT‡

*Dedicated to Ed Saff on the occasion of his 60th birthday*

**Abstract.** We show that the inverse monopolar or dipolar source problem in a 3D ball from overdetermined Dirichlet-Neumann data on the boundary sphere reduces to a family of 2D inverse branchpoint problems in cross sections of the sphere, at least when there are finitely many sources. We adapt from [L. Baratchart et al., *Recovery of pointwise sources or small inclusions in 2D domains and rational approximation*, Inverse Problems, 21 (2005), pp. 51–74] an approach to these 2D inverse problem which is based on meromorphic approximation, and we present numerical results.

**Key words.** inverse source problems, potential theory, meromorphic approximation

**AMS subject classifications.** 31A25, 30E10, 30E25, 35J05

*Received June 9, 2005. Accepted for publication December 20, 2005. Recommended by D. Lubinsky. The work of the first two authors was partially supported by NATO grant PST.CLG.979703.

†INRIA, BP 93, 06902 Sophia-Antipolis Cedex, France
(laurent.baratchart, juliette.leblond@sophia.inria.fr).

‡CMA, Ecole des Mines, BP 93, 06902 Sophia-Antipolis Cedex, France (jpm@tonic.cma.fr).