Geophysical Research Abstracts
Vol. 12, EGU2010-9737, 2010
EGU General Assembly 2010
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Meshless boundary element methods for exterior problems on spheroids

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Meshless boundary element methods for exterior problems on spheroids

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Abstract

In geophysical applications, one is interested in the Neumann problem exterior to a spheroid where the orbits of satellites are located. The satellite creates data which amount to boundary conditions in scattered points. As a model problem, we consider the exterior Neumann problem of the Laplacian with boundary condition on an oblate spheroid. We propose to use spherical radial basis functions in the solution of the boundary integral equation arising from the Dirichlet-to-Neumann map. Our approach is particulary suitable for handling scattered satellite data. We also propose a preconditioning technique based on domain decomposition methods to deal with ill-conditioned matrices arising from the approximation problem. For results on the sphere see [1].

References

[1] E. P. Stephan, T. Tran and A. Costea - A boundary integral equation on the sphere for high-precision geodesy. *Computer Methods in Mechanics: Lectures of the CMM 2009* , 99–110, 2010.

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