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**Christian Gerhards\*** (gerhards@mathematik.uni-kl.de), PO Box 3049, Geomathematics Group, 67653 Kaiserslautern, Germany. *Modeling the Geomagnetic Field by Locally Supported Wavelets*. Preliminary report.

In this talk we present a space oriented multiscale approach to the modeling of electromagnetic currents in the earth's ionosphere. The currents are coupled with the magnetic field via the pre-Maxwell equations which can be reduced to simple differential equations for the poloidal and toroidal scalars involving the surface operators  $L^*$ ,  $\nabla^*$  and  $\Delta^*$ . With help of Green's function for the Beltrami operator  $\Delta^*$ , we can from this construct locally supported scale-dependent kernel functions to express the currents in terms of a series of convolutions with the magnetic field. Magnetic field data, however, is generally given on a sphere of fixed radius, so that only the radial part of the currents can be adequately reconstructed. Some further physical assumptions reduce the calculation of the horizontal currents to the solution of a spherical counterpart to the pre-Maxwell equations. We give a brief overview on how techniques similar to the radial case can be applied to these differential equations and what physical information one might get from this. (Received September 21, 2009)