

**Meeting:** 1003, Atlanta, Georgia, SS 17A, AMS-SIAM Special Session on Nonsmooth Analysis in Variational and Imaging Problems, I

1003-41-1372      **Willi Freeden\*** ([freeden@mathematik.uni-kl.de](mailto:freeden@mathematik.uni-kl.de)), TU Kaiserslautern, Geomathematics Group, 67663 Kaiserslautern, Germany. *Vector Radial Basis Functions and Isotropic Pseudo-differential Operators on the Sphere.*

For the decomposition of spherical vector fields the Helmholtz theorem plays an important role. According to this concept the tangential part of the vector field is split into a curl-free and a divergence-free field by use of two (pseudo-)differential operators, viz. the surface gradient and the surface curl gradient (see [FGS]). These operators applied to scalar spherical harmonics result in a system of vector functions known in (geo)sciences as vector spherical harmonics.

The lecture demonstrates that the capability of vector spherical harmonics to introduce vector radial basis functions and pseudo-differential operators makes them an important tool for the (multiscale) solution of (geo)scientifically relevant inverse problems (see [FM]).

References.

[FGS] Freeden, W., Gervens, T., Schreiner, M. (1998). *Constructive Approximation on the Sphere (with Applications to Geomathematics)*. Clarendon Press, Oxford.

[FM] Freeden, W., Michel, V. (2004). *Multiscale Potential Theory (with Applications to Geosciences)*. Birkhaeuser, Boston, Basel, Berlin. (Received October 05, 2004)