1086-65-1209 **Roger Telschow***, www.geomathematics-siegen.de. *Iterative Sparse Approximation of Extremely Scattered Data on the Sphere.*

Recent applications often produce highly non-equidistributed data on the sphere. The distribution of such scattered data sets causes several problems which are hardly solvable with the established approximation methods. Whereas the expansion of the signal in a global basis fails for obvious reasons, the use of localizing basis functions, such as spline bases, can also be connected to severe numerical drawbacks. For instance, in case of extremely scattered data, the latter most often yield highly ill-conditioned systems of equations that have to be strongly regularized. We present a novel algorithm based on an orthogonal matching pursuit which iteratively chooses the optimal set of basis functions out of a large redundant dictionary and finds a smooth and sparse solution. We obtain an expansion of the signal which may combine arbitrary spherical basis functions while smoothness is controlled with a certain Sobolev norm. Moreover, the solution is adapted to the detail structure of the signal as well as to the data. Numerical experiments are presented. (Received September 20, 2012)