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**Volker Michel\***, Department of Mathematics, University of Siegen, Walter-Flex-Str. 3, 57068 Siegen, Germany. *A Greedy Algorithm for the Regularization of Inverse Problems in Geophysics and Medical Imaging.*

A nonlinear approximation method for the regularization of ill-posed inverse problems is presented. It is applicable to inverse problems which are representable by a finite set of linear and continuous functionals (e.g. samples of the right-hand side of a Fredholm integral equation). Problems of this type, in particular in combination with domains which are a sphere or a ball, occur e.g. in the geosciences and in medical imaging. The presented method is based on a Matching Pursuit for data interpolation by Mallat and Zhang and by Vincent and Bengio. The novelties of the approach are: first, inverse problems can be solved (i.e. data and solution can originate from different spaces and may be connected by equations to be solved); second, a regularization term to stabilize ill-posed problems is included; third, in the implementation we use global and localized trial functions (orthogonal polynomials, splines, wavelets etc.) on a ball or a sphere.

The algorithm, which we call the Regularized (Orthogonal) Functional Matching Pursuit (RFMP and ROFMP, resp.) is able to combine the features of different basis systems known from signal analysis. It provides a stable and sparse approximation to the unknown solution. Theoretical properties and numerical results are shown. (Received September 16, 2014)