5005-C1-31

Matthew A. Herman* (`mattyh@math.ucdavis.edu`), Department of Mathematics, One Shields Avenue, University of California, Davis, CA 95616, and **Thomas Strohmer** (`strohmer@math.ucdavis.edu`), Department of Mathematics, One Shields Avenue, University of California, Davis, CA 95616. *Identifying Linear Time Varying Systems via Compressed Sensing.*

We study the general problem of identifying an unknown N by N matrix A which has a sparse representation with respect to an orthonormal basis of matrices. The goal is to design a vector f so that A can be recovered by observing Af. This has applications in identifying linear time-varying (LTV) channels, which is important in designing reliable communication networks. LTV channels can be modeled as the superposition of weighted time-frequency shifts. Often, it is known a priori that these weights have sparse support. By observing Hf, where H is the channel operator and f is a random probing signal, we can infer the properties of H. This is done by constructing a full Gabor system F based on f. Recovering a sparse vector in this manner differs in several ways from classical sparse reconstruction methodologies. In particular, the number of rows and columns in the measurement matrix F is constrained to be N by N^2. As an example we show how a deterministic signal f can yield a pseudo-random matrix F. Experimental results and analysis indicate the effectiveness of this approach. We also discuss several other applications which can benefit from this technique. (Received May 25, 2007)