Jameson Cahill, Pete Casazza and Shidong Li* (shidong@sfsu.edu), Department of Mathematics, San Francisco State University, San Francisco, CA 94132. Sparsity of the fusion frame operator and nonorthogonal fusion frames.

Fusion Frames study ways in which functions or signals from a set of subspaces can be combined coherently regardless how complicated subspaces are related. It has a deep root in data fusion applications for distributed systems such as sensor networks. Nevertheless, it has been seen that the fusion operation involves a fusion frame operator that is seldom sparse. While some applications can enjoy powerful constructions of Parseval fusion frames, a lot more distributed systems do not have the luxury for subspace selections, nor for subspace transformations or rotations. Non-orthogonal fusion frames extend fusion frames in which non-orthogonal projections become fundamental building blocks. We show that not only the (non-orthogonal) fusion frame operator can become sparse, it can also be made diagonal. Multi-fusion frames are also naturally introduced. As a result, the set of underlying subspaces no longer needs to be complete. Tight (non-orthogonal) fusion frames can be built based on one proper subspace. Simple and natural implementation of the non-orthogonal fusion frames via pseudoframes for subspace will be discussed. Comments on related works and why projections are necessary tools will be provided. (Received September 21, 2010)