1096-15-2428 **Justin Marks*** (jmarks@bowdoin.edu), **Matthew Fickus** and **Miriam J. Poteet**.

Constructing optimal finite frames with a given set of lengths.

When constructing finite frames for a given application, the most important consideration is the spectrum of the frame operator. Indeed, the minimum and maximum eigenvalues of the frame operator are the optimal frame bounds, and the frame is tight precisely when this spectrum is constant. Often, the second-most important design consideration is the lengths of frame vectors. For instance, unit norm tight frame-based encoding is known to be optimally robust against additive noise and erasures. We consider the problem of constructing frames such that the corresponding frame operator has an optimal spectrum and whose vectors have prescribed lengths. For a given spectrum and set of lengths, the existence of such frames is characterized by the Schur-Horn Theorem—they exist if and only if the spectrum majorizes the squared lengths—the classical proof of which is nonconstructive. Certain construction methods are known in special cases. In this talk, we introduce an algorithm to construct the optimal frame in the general case, building from a given initial frame with known spectrum. We describe the proof of optimality of the constructed frame. (Received September 17, 2013)