1077-15-118 **Martin S. Copenhaver*** (copenhaver@gatech.edu), **Cortney Logan** (clogan@students.stonehill.edu), **Kyanne Mayfield** (mayfield13@up.edu) and **Jonathan Sheperd** (jsheperd@nd.edu). *Diagram vectors of frames and the tight frame scaling problem.*

A frame is a redundant spanning set. A tight frame is a generalization of an orthonormal basis. A notion of digram vectors associated to frames in $\mathbb{R}^2$ has yielded many results about tight frames in $\mathbb{R}^2$. We provide a generalized notion of diagram vectors which allows for significant developments in the theory of tight frames in finite dimensions. In particular, we completely answer the *tight frame scaling problem* - that is, given a set of unit vectors $\{f_i\}_{i=1}^k$ in a finite dimensional Hilbert space $\mathcal{H}_n$, when do there exist positive scalars $c_1, \ldots, c_k$ so that $\{c_i f_i\}_{i=1}^k$ is a tight frame? When such scalings do exist, we provide a means of determining coefficients using a specific formulation for $\mathbb{R}^2$ as well as a general approach for $\mathcal{H}_n$ using techniques from computational geometry. (Received July 28, 2011)