

1108-46-24

Peter G Casazza, Eric Pinkham and Brian Tuomanen* (bpt6gc@missouri.edu). *Riesz Outer Product Hilbert Space Frames: Quantitative Bounds, Topological Properties, and Full Geometric Characterization*. Preliminary report.

In this paper, we make the first detailed study of the family of outer product frames induced directly by vector sequences. We are interested in both the quantitative frame attributes of these outer product sequences, as well as their independence and spanning properties. We show that Riesz sequences of vectors yield Riesz sequences of outer products with the same (or better) Riesz bounds. Equiangular tight frames are shown to produce Riesz sequences with optimal Riesz bounds for outer products. We provide constructions of frames which produce Riesz outer product bases with "good" Riesz bounds. We show that the family of unit norm frames which yield independent outer product sequences is open and dense within the topological space $\otimes_{i=1}^M S_{N-1}$ where M is less than or equal to the dimension of the space of symmetric operators on \mathbb{H}^N ; that is to say, almost every frame with such a bound on its cardinality will induce a set of independent outer products. Thus, this would mean that finding the necessary and sufficient conditions such that the induced outer products are dependent is a more interesting question. Finally we give a full analytic and geometric classification of such sequences which produce dependent outer products. (Received November 13, 2014)