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MATH 296 GRADUATE SEMINAR

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Mathematics Conference Room

Constructing non-Euclidean PIDs using Conic and Cubic Curves

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ABSTRACT. A well known result from abstract algebra is that all Euclidean domains are principal ideal domains and all principal ideal domains are unique factorization domains. It is known that the converses of these statements are not true. We observe that role of factorizations played in number theory and some counter-examples to the converses mentioned above. We build on recent results to explore the construction of non-Euclidean principal ideal domains, using both conic and cubic curves.

Constructing Global Frames via Local Sampling Inequalities

Arvin D.C Lamando

ABSTRACT. This study deals with the construction of global frames for $L^2(\mathbb{R}^d)$ functions from irregularly sampled points in the time-frequency plane with certain uniform local properties to allow for adaptivity. Locally adaptive frames have been studied in [1], where the resulting frame for $L^2(\mathbb{R}^d)$ was constructed from existing global frames by taking local systems corresponding to appropriately chosen regions in the time-frequency plane. Our aim is to relax the prerequisite of needing existing global frames for such an adaptive construction. Our strategy then is to study how to choose sampling points in a local region in the time-frequency plane such that a local frame-like sampling inequality holds, and then using these inequalities to patch up a global frame for $L^2(\mathbb{R}^d)$. We are also interested in investigating how time-frequency localization operators can give rise to local sampling inequalities. One of our preliminary result is that global frame bounds can be constructed by replacing a finite number of atoms in a Gabor system with another, randomly sampled, local system that only admits a local frame for the subspace of $L^2(\mathbb{R}^d)$ induced by a finite span of the eigenvalues of a time-frequency localization operator.

[1] Drfler, M. (2011, April 01). Quilted Gabor Frames - A new concept for adaptive time-frequency representation. Retrieved from https://www.sciencedirect.com/science/article/pii/S0196885811000157

Keywords. Localization Operators, Gabor Frames, Time-Frequency Analysis, Sampling Inequalities