





SEMINARIO

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Connecting Fourier Decompositions and Frequency Modulated Möbius: Theory and Implications for Signal Analysis

Abstract: The decomposition of oscillatory signals into interpretable components is a fundamental task in signal processing, with critical applications in biomedical domains such as electrocardiogram (ECG) analysis. Among existing techniques, Adaptive Fourier Decomposition (AFD) and Frequency Modulated Möbius (FMM) are particularly effective for modeling multichannel signals exhibiting oscillatory dynamics. In this work, we rigorously establish the equivalence between AFD and FMM for finite-order expansions, demonstrating that—under broad and natural conditions—both approaches reduce to the same underlying optimization problem. This result bridges two seemingly distinct paradigms: AFD, a non-parametric, dictionary-based method known for its fast convergence and computational simplicity; and FMM, a parametric formulation that offers interpretability through a low-dimensional set of meaningful signal parameters.

Seminario del IMUVA, edificio LUCIA Martes 1 de Julio de 2025 (9:45)

