

SIMION STOILOW INSTITUTE OF MATHEMATICS OF THE ROMANIAN ACADEMY

Monthly conference

A Hierarchical Structure within Harmonic Analysis

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Wednesday, December 7, 2022, 14:00h

Miron Nicolescu amphiteater

In this talk we will discuss a natural hierarchical structure that governs a vast territory within the classical harmonic analysis area:

(1) *non-zero curvature problems*: this usually involves the study of objects that lack (generalized) modulation invariance; prominent examples within this class are the "curved" Carleson operator and the linear and bilinear Hilbert transforms along "non-flat" curves.

(2) *zero-curvature problems*: this focuses on objects that, on top of the standard dilation and translation symmetries, also exhibit a (generalized) modulation invariance; prominent examples within this class are the classical Carleson operator and the Bilinear Hilbert transform.

(3) *hybrid problems*: this refers to the study of objects that share both zero and non-zero curvature features; prominent examples within this class are the Polynomial Carleson operator and the newly introduced Bilinear Hilbert-Carleson operator and "hybrid" Trilinear Hilbert transform.

In the first part of the talk we will elaborate on the main concepts and definitions, with an emphasis on an intuitive and at the same time panoramic view of the subject. The second part of the talk will be centered around some very recent (joint) contributions of the speaker within the realm of the hybrid problem category. A special role will be played by the LGC-methodology and the model operators introduced by the speaker in order to provide a better understanding of the celebrated open question on the boundedness of the Trilinear Hilbert transform.