Workshop dedicated to the memory of Professor Gabriela Kohr
(6th edition)
Geometric Function Theory in Several Complex Variables and Complex Banach Spaces
Cluj-Napoca, Romania November 27 – 29, 2026

Approximation by polynomials in weak Banach spaces of vector-valued analytic functions

Mark Elin
Braude College of Engineering, Karmiel, Israel

Abstract

We study Banach spaces of analytic functions taking values in a Banach space Y, with particular focus on the weak spaces $U[Y]$ introduced by Bonet et al.

A key feature of these spaces is that they are generically inseparable, so analytic functions within them cannot, in general, be approximated by polynomials.

We derive explicit formulas for the distance from a given function to the set of polynomials of fixed degree, and to the closure of all polynomials. To analyze polynomial approximation more systematically, we construct a linear map $U[Y] \to L(Y^*, U)$ that associates to each function $f \in U[Y]$ a linear operator $T_f : Y^* \to U$. This operator-theoretic framework allows properties of $f \in U[Y]$ related to polynomial approximation to be expressed in terms of operator-theoretic properties of T_f.

We also explore the relationship between polynomial approximation and solid core of a Banach space.

Joint work with G. Katriel.