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*Noncommutative Functions and Their Regularity Properties*

Over the course of the last two decades, there emerged a general paradigm for passing from the commutative situation to the free noncommutative situation: we replace a vector space by the disjoint union of spaces of square matrices of all sizes over it. When applied to function theory on the vector space in question, this leads to noncommutative or fully matricial functions as studied by the speaker and D. S. Kaliuzhnyi-Verbovetskyi and by D.-V. Voiculescu; the origins of this theory actually go back to the pioneering work of J. L. Taylor on noncommutative functional calculi. In this talk, I will review some of the salient features of the theory of noncommutative functions with a special emphasis on their amazing regularity properties: over a finite-dimensional vector space, a noncommutative function that is locally bounded on slices, separately in every matrix dimension, is actually entrywise analytic in every matrix dimension, and admits a noncommutative power series expansion that converges locally uniformly.