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Multivariable operator theory

Multivariable operator theory is, simply put, the study of more than one linear operator at a time. Much of the research in this area concerns the behavior of commuting operators, where the theory is closely connected to classical areas of mathematics like function theory, commutative algebra and algebraic geometry. Recently, however, some progress has been made in the study of noncommuting operators. The results obtained so far suggest there should be "noncommutative" counterparts of some classical areas of mathematics. Moreover, there turns out to be a surprising amount of interplay between the commutative and the noncommutative theory.

In this talk, I will give a high level overview of the subject of multivariable operator theory and describe some of these recent developments. For motivation, I will consider some natural questions that are difficult to answer even for operators acting on finite-dimensional spaces. I will discuss how these questions can be answered using tools from multivariable operator theory.