Special functions and unitarity

Erik Koelink
Radboud University, the Netherlands
e.koelink@math.ru.nl

Orthogonal polynomials and special functions often behave well with respect to certain integral transforms which can be viewed as unitary operators on a Hilbert space of functions. A classic example is the Fourier transform mapping Hermite functions to Hermite functions. Such integral transforms can also be used to map 'simpler' special functions to more 'complicated' ones. There are several approaches to understand these transforms, such as e.g. via the study of the kernels or via the study of an appropriate self-adjoint operator on a suitable Hilbert space of functions. We discuss these approaches and give several examples.