

Categorical transfer between linear operators

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In this talk, I will present an ongoing work whose purpose is to develop a general new method to transfer properties of a linear operator to another. The initial idea was to transfer a Runge approximation property from the Laplace operator to the Stokes operator, by proceeding in several stages, transferring information back and forth by the means of identities, which involve auxiliary operators which are all local. Yet, it turned out that such a strategy can be extended to the transfer of various properties, such as Fredholmness, local solvability, hypoellipticity, unique continuation and controllability. We will see how categorical language may describe, in a unified way, such transfers, by identifying auxiliary operators, involved in combinations of up to specific identities, as morphisms between two given operators. Such "transfer categories" can then be tailored to different contexts and needs in algebra, functional analysis, and PDEs.