The Schur Algorithm, Reproducing Kernel Spaces and System Theory

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Description
The same positive functions (in the sense of reproducing kernel spaces) appear in a natural way in two different domains, namely the modeling of time-invariant dissipative linear systems and the theory of linear operators. We use the associated reproducing kernel Hilbert spaces to study the relationships between these domains. The inverse scattering problem plays a key role in the exposition. The reproducing kernel approach allows us to tackle in a natural way more general cases, such as nonstationary systems, the case of a non-positive metric and the case of pairs of commuting nonself-adjoint operators.

ISBN
978-0821821558

Publication Date
2001

Publisher
American Mathematical Society

City
Providence, Rhode Island

Disciplines
Algebra | Discrete Mathematics and Combinatorics | Other Mathematics

Comments

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Recommended Citation

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Operator theory, system theory, scattering theory, and the theory of analytic functions of one complex variable are deeply related topics, and the relationships between these theories are well understood. When one leaves the setting of one operator and considers several operators, the situation is much more involved. Such functions, often called Schur functions, have a rich theory of their own, especially in connection with the classical interpolation problems. They also have different facets arising from their appearance in different areas, in particular as:

- characteristic operator functions, in operator model theory.

In Reproducing kernel spaces and applications, volume 143 of Oper. Theory Adv. Appl., pp. 135–146. Reproducing Kernel Hilbert Spaces. 9.520 Class 03, 15 February 2006. Andrea Caponnetto. About this class. Goal To introduce a particularly useful family of hypothesis spaces called Reproducing Kernel Hilbert Spaces (RKHS) and to derive the general solution of Tikhonov regularization in RKHS.