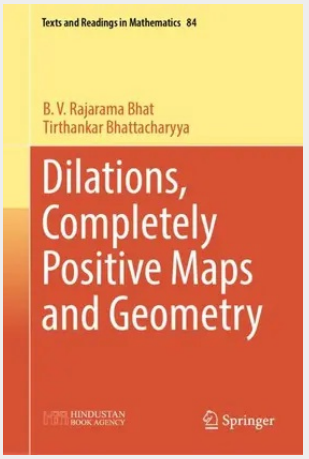
Bhat / Bhattacharyya

Dilations, Completely Positive Maps and Geometry



This book introduces the dilation theory of operators on Hilbert spaces and its relationship to complex geometry. Classical as well as very modern topics are covered in the book. On the one hand, it introduces the reader to the characteristic function, a classical object used by Sz.-Nagy and Foias and still a topic of current research. On the other hand, it describes the dilation theory of the symmetrized bidisc which has been developed mostly in the present century and is a very active topic of research. It also describes an abstract theory of dilation in the setting of set theory. This was developed very recently.

A good portion of the book discusses various geometrical objects like the bidisc, the Euclidean unit ball, and the symmetrized bidisc. It shows the similarities and differences between the dilation theory in these domains. While completely positive maps play a big role in the dilation theory of the Euclidean unit ball, this is not so in the symmetrized bidisc for example. There, the central role is played by an operator equation. Targeted to graduate students and researchers, the book introduces the reader to different techniques applicable in different domains.

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