

## Editorial Introduction

This volume of the *Operator Theory: Advances and Applications* series (OTAA) is the first volume of a new subseries. This subseries is dedicated to connections between the theory of linear operators and the mathematical theory of linear systems and is named *Linear Operators and Linear Systems* (LOLS). As the existing subseries *Advances in Partial Differential Equations* (ADPE), the new subseries will continue the traditions of the OTAA series and keep the high quality of the volumes. The editors of the new subseries are: Daniel Alpay (Beer-Sheva, Israel), Joseph Ball (Blacksburg, Virginia, USA) and André Ran (Amsterdam, The Netherlands).

In the last 25–30 years, Mathematical System Theory developed in an essential way. A large part of this development was connected with the use of the state space method. Let us mention for instance the “theory of  $H_\infty$  control”. The state space method allowed to introduce in system theory the modern tools of matrix and operator theory. On the other hand the state space approach had an important impact on Algebra, Analysis and Operator Theory. In particular it allowed to solve explicitly some problems from interpolation theory, theory of convolution equations, inverse problems for canonical differential equations and their discrete analogs. All these directions are planned to be present in the subseries LOLS. The editors and the publisher are inviting authors to submit their manuscripts for publication in this subseries.

This volume contains five essays. The essay of D. Arov and O. Staffans, *State/signal linear time-invariant systems theory, part I: discrete time systems*, contains new results in classical system theory. The essays of D. Alpay and D.S. Kaluzhnyi-Verbovetzkiĭ, *Matrix- $J$ -unitary non-commutative rational formal power series*, and of J.A. Ball, G. Groenewald and T. Malakorn, *Conservative structured noncommutative multidimensional linear systems* are dedicated to a new branch in Mathematical system theory where discrete time is replaced by the free semigroup with  $N$  generators. The essay of I. Gohberg, I. Haimovici, M.A. Kaashoek and L. Lerer, *The Bezout integral operator: main property and underlying abstract scheme* contains new applications of the state space method to the theory of Bezoutians and convolution equations. The essay of D. Alpay and I. Gohberg *Discrete analogs of canonical systems with pseudo-exponential potential. Definitions and formulas for the spectral matrix functions* is concerned with new results and formulas for the discrete analogs of canonical systems.

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