

## **Preface**

Motivated both by practical problems in physics and engineering and by intrinsic mathematical questions, the control theory of distributed systems has undergone a rapid evolution since the years 1960-1970. The early works of A. V. Balakrishnan, J.-L. Lions and D. L. Russell on control theory for systems described by partial differential equations exerted a great influence and opened the way to a very broad research activity involving hundreds of people. Several distinct but interconnected branches developed: optimal control, observability and controllability, stabilization, the corresponding numerical methods, etc. The emergence of new possible applications (spacecraft structures, smart materials, etc.) required a deeper mathematical analysis of the underlying models of elasticity. The purpose of this special issue is to present some of the main research directions in this field by publishing new results obtained recently by some of the leading specialists of this domain. Page limitations did not allow us to include many other important articles by the other leading researchers, but hopefully some convenient occasion will arise in the near future.

The papers of this volume reflect the following main topics:

- optimal control theory;
- exact observability and controllability of linear systems;
- approximate and exact controllability of nonlinear systems;
- stabilization in structural acoustics;
- formation theory and problems of actuator deployment;
- modelling, observability and control of complex elastic structures.

It is hoped that the Readers will find this volume interesting and that it will also constitute a tangible contribution to the domain.

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