
Preface

Control theory provides a large set of theoretical and computational tools with applications in a wide range of fields, running from "pure" branches of mathematics, like geometry, to more applied areas where the objective is to find solutions to "real life" problems, as is the case in robotics, control of industrial processes or finance.

The "high tech" character of modern business has increased the need for advanced methods. These rely heavily on mathematical techniques and seem indispensable for competitiveness of modern enterprises. It became essential for the financial analyst to possess a high level of mathematical skills. Conversely, the complex challenges posed by the problems and models relevant to finance have, for a long time, been an important source of new research topics for mathematicians.

The use of techniques from stochastic optimal control constitutes a well established and important branch of mathematical finance. Up to now, other branches of control theory have found comparatively less application in financial problems.

To some extent, deterministic and stochastic control theories developed as different branches of mathematics. However, there are many points of contact between them and in recent years the exchange of ideas between these fields has intensified. Some concepts from stochastic calculus (e.g., rough paths) have drawn the attention of the deterministic control theory community. Also, some ideas and tools usual in deterministic control (e.g., geometric, algebraic or functional-analytic methods) can be successfully applied to stochastic control.

We strongly believe in the possibility of a fruitful collaboration between specialists of deterministic and stochastic control theory and specialists in finance, both from academic and business backgrounds. It is this kind of collaboration that the organizers of the *Workshop on Mathematical Control Theory and Finance* wished to foster.

This volume collects a set of original papers based on plenary lectures and selected contributed talks presented at the *Workshop*. They cover a wide

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range of current research topics on the mathematics of control systems and applications to finance. They should appeal to all those who are interested in research at the junction of these three important fields as well as those who seek special topics within this scope.

The editors of these proceedings express their deep gratitude to those who contributed with their work to this volume and those who kindly helped us in peer-reviewing them.

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CEOC – Centro de Estudos em Optimização e Controlo,
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*Maria do Rosário Grossinho
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Andrey Sarychev
Albert Shiryaev*

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