[PDF Download] Nonlinear Control of Vehicles and Robots Full Book

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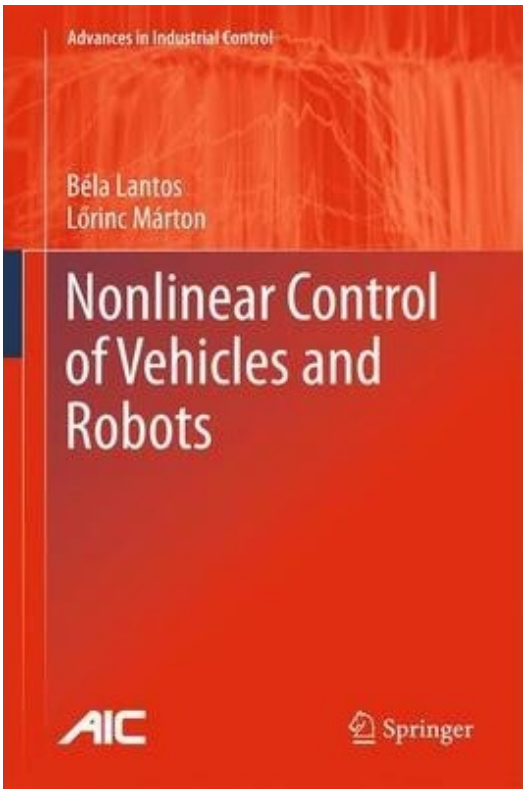

Synopsis:

Nonlinear Control of Vehicles and Robots develops a unified approach to the dynamic modeling of robots in terrestrial, aerial and marine environments. The main classes of nonlinear systems and stability methods are summarized and basic nonlinear control methods, useful in manipulator and vehicle control, are presented. Formation control of ground robots and ships is discussed.

The book also deals with the modeling and control of robotic systems in the presence of non-smooth nonlinearities. Robust adaptive tracking control of robotic systems with unknown payload and friction in the presence of uncertainties is treated.

Theoretical and practical aspects of the control algorithms under discussion are detailed. Examples are included throughout the book allowing the reader to apply the control and modeling techniques in their own research and development work. Some of these examples demonstrate state estimation

based on the use of advanced sensors as part of the control system.

Additional Info:

Review quote

From the reviews:

"The presented book first briefly outlines the most important nonlinear control algorithms that can be applied for the control of mechanical systems. ... The book is aimed at researchers who are interested in modern control algorithms and advanced modeling techniques of the most common mechatronic systems: vehicles and robots." (Bojidar Cheshankov, Zentralblatt MATH, Vol. 1236, 2012)

About Béla Lantos

Professor Bela Lantos is based at Budapest University of Technology and Economics, and is lead researcher for leads many scientific grants related to robot and vehicle control. Currently, He leads the `Advanced Control Theory and Artificial Intelligence Techniques of Autonomous Ground, Aerial, and Marine Robots' research group, financed by Hungarian National Research program under grant No. OTKA K 71762.

Lorinc Marton is an assistant lecturer at Sapientia Hungarian University of Transylvania and is a grantee of Janos Bolyai postdoctoral scholarship, financed by the Hungarian Academy of Sciences. He is also a senior researcher in the OTKA K 71762 research program.

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Tracking of autonomous vehicles and the high-precision positioning of robotic

manipulators require advanced modeling techniques and control algorithms. Controller design should take into account any model nonlinearities.

Nonlinear Control of Vehicles and Robots develops a unified approach to the dynamic modeling of robots in terrestrial, aerial and marine environments. To begin with, the main classes of nonlinear systems and stability methods are summarized. Basic nonlinear control methods useful in manipulator and vehicle control - linearization, backstepping, sliding-mode and receding-horizon control - are presented. Formation control of ground robots and ships is discussed.

The second part of the book deals with the modeling and control of robotic systems in the presence of non-smooth nonlinearities including analysis of their influence on the performance of motion control systems. Robust adaptive tracking control of robotic systems with unknown payload and friction in the presence of uncertainties is treated.

Theoretical (guaranteed stability, guaranteed tracking precision, boundedness of all signals in the control loop) and practical (implementability) aspects of the control algorithms under discussion are detailed. Examples are included throughout the book allowing the reader to apply the control and modeling techniques in their own research and development work. Some of these examples demonstrate state estimation based on the use of advanced sensors such as Inertial Measurement System, Global Positioning System and vision systems as part of the control system.

Nonlinear Control of Vehicles and Robots will interest academic researchers studying the control of robots and industrial research and development engineers and graduate students wishing to become familiar with modern control algorithms and modeling techniques for the most common mechatronics systems: vehicles and robot manipulators.

Table of contents

Systems with Non-smooth Nonlinearities.- Mechanical Control Systems with Non-smooth Nonlinearities.- Model-based Identification and Adaptive Compensation of Non-smooth Nonlinearities.- Conclusions and Future Research Directions.- Appendices.

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