

1. Record Nr.	UNINA9910659482003321
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Titolo	Advanced Model Predictive Control for Autonomous Marine Vehicles // by Yang Shi, Chao Shen, Henglai Wei, Kunwu Zhang
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2023
ISBN	3-031-19354-7
Edizione	[1st ed. 2023.]
Descrizione fisica	1 online resource (210 pages)
Collana	Advances in Industrial Control, , 2193-1577
Disciplina	629.8 623.8205
Soggetti	Automatic control Robotics Offshore structures System theory Control theory Control and Systems Theory Robotic Engineering Offshore Engineering Systems Theory, Control
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	1. Introduction -- 2. AUV Modelling -- 3. Receding Horizon Optimization for Integrated Path Planning and Tracking Control of an AUV -- 4. Lyapunov-Based Model Predictive Control for Dynamic Positioning and Trajectory Tracking Control of an AUV -- 5. Multi-Objective Model Predictive Control for Path Following Control of an AUV -- 6. Efficient Implementation Algorithms for NMPC Trajectory Tracking Control of an AUV -- 7. Distributed Lyapunov-based Model Predictive Formation Tracking Control for AUVs Subject to Disturbances -- 8. Conclusions and Future Work.
Sommario/riassunto	This book provides a comprehensive overview of marine control system design related to underwater robotics applications. In particular, it presents novel optimization-based model predictive control strategies

to solve control problems appearing in autonomous underwater vehicle applications. These novel approaches bring unique features, such as constraint handling, prioritization between multiple design objectives, optimal control performance, and robustness against disturbances and uncertainties, into the control system design. They therefore form a more general framework to design marine control systems and can be widely applied. Advanced Model Predictive Control for Autonomous Marine Vehicles balances theoretical rigor – providing thorough analysis and developing provably-correct design conditions – and application perspectives – addressing practical system constraints and implementation issues. Starting with a fixed-point positioning problem for a single vehicle and progressing to the trajectory-tracking and path-following problem of the vehicle, and then to the coordination control of a large-scale multi-robot team, this book addresses the motion control problems, increasing their level of challenge step-by-step. At each step, related subproblems such as path planning, thrust allocation, collision avoidance, and time constraints for real-time implementation are also discussed with solutions. In each chapter of this book, compact and illustrative examples are provided to demonstrate the design and implementation procedures. As a result, this book is useful for both theoretical study and practical engineering design, and the tools provided in the book are readily applicable for real-world implementation.
