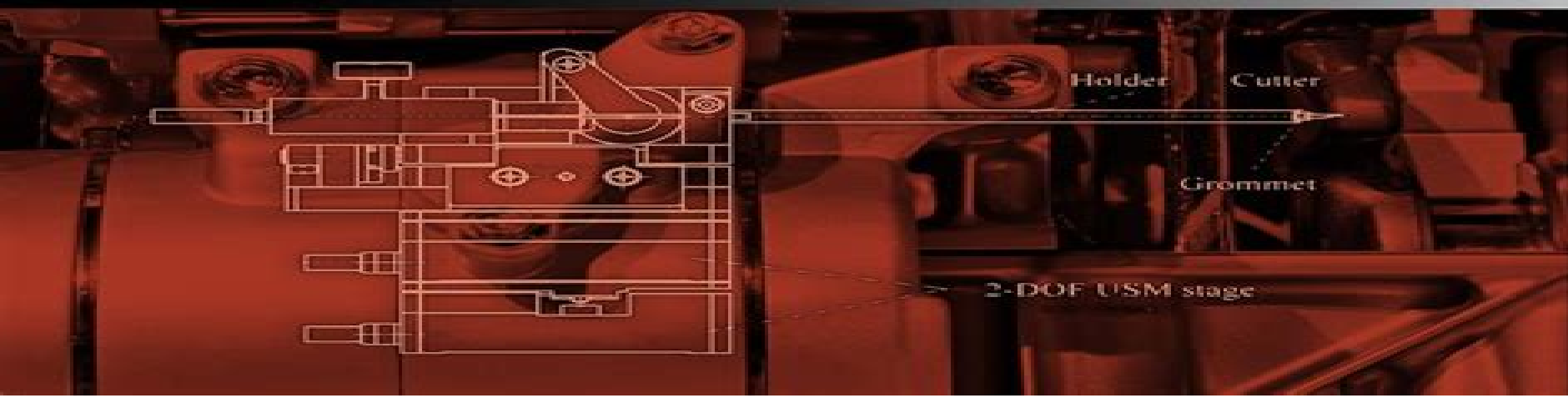


Modeling and Control of Precision Actuators



Tan Kok Kiong • Huang Sunan



Modeling And Control Of Precision Actuators

**Md Afshar Alam, Farheen
Siddiqui, Sherin Zafar, Imran Hussain**

Modeling And Control Of Precision Actuators:

Modeling and Control of Precision Actuators Tan Kok Kiong, Huang Sunan, 2018-10-08 Modeling and Control of Precision Actuators explores new technologies that can ultimately be applied in a myriad of industries It covers dynamical analysis of precise actuators and strategies of design for various control applications The book addresses four main schemes modeling and control of precise actuators nonlinear control of precise actuators including sliding mode control and neural network feedback control fault detection and fault tolerant control and advanced air bearing control It covers application issues in the modeling and control of precise actuators providing several interesting case studies for more application oriented readers Introduces the driving forces behind precise actuators Describes nonlinear dynamics of precise actuators and their mathematical forms including hysteresis creep friction and force ripples Presents the control strategies for precise actuators based on Preisach model as well as creep dynamics Develops relay feedback techniques for identifying nonlinearities such as friction and force ripples Discusses a MPC approach based on piecewise affine models which emulate the frictional effects in the precise actuator Covers the concepts of air bearing stages with the corresponding control method Provides a set of schemes suitable for fault detection and accommodation control of mechanical systems Emphasizing design theory and control strategies the book includes simulation and practical examples for each chapter covers precise actuators such as piezo motors coil motors air bearing motors and linear motors discusses integration among different technologies and includes three case studies in real projects The book concludes by linking design methods and their applications emphasizing the key issues involved and how to implement the precision motion control tasks in a practical system It provides a concise and comprehensive source of the state of the art developments and results for modeling and control of precise actuators

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control strategies the book includes simulation and practical examples for each chapter covers precise actuators such as piezo motors coil motors air bearing motors and linear motors discusses integration among different technologies and includes three case studies in real projects The book concludes by linking design methods and their applications emphasizing the key issues involved and how to implement the precision motion control tasks in a practical system It provides a concise and comprehensive source of the state of the art developments and results for modeling and control of precise actuators

Precision Motion Systems Jian Liang,Bindi You,Deqing Huang,Si-Lu Chen,Lei Liu,2019-05-30 Precision Motion Systems Modeling Control and Applications presents basic dynamics and the control knowledge needed for the daily challenges of researchers and professionals working in the field The book explains accurate dynamics and control algorithms along with experimental validation of precision systems in industrial medical airborne and spaceborne applications By using the proposed experimental designs readers will be able to make further developments and validations Presents accurate dynamics and control algorithms in industrial medical airborne and spaceborne applications Explains basic dynamics and control knowledge such as Laplace transformations and stability analysis Teaches how to design develop and control typical precision systems *Model-Based Control*: Paul M.J. van den Hof,Carsten Scherer,Peter S.C. Heuberger,2009-08-05 Model Based Control will be a collection of state of the art contributions in the field of modelling identification robust control and optimization of dynamical systems with particular attention to the application domains of motion control systems high accuracy positioning systems and large scale industrial process control systems The book will be directed to academic and industrial people involved in research in systems and control industrial process control and mechatronics **Soft Actuators** Kinji Asaka,Hidenori Okuzaki,2014-11-17 The subject of this book is the current comprehensive research and development of soft actuators and encompasses interdisciplinary studies of materials science mechanics electronics robotics and bioscience As an example the book includes current research on actuators based on biomaterials to provide future perspectives for artificial muscle technology Readers can obtain detailed useful information about materials methods of synthesis fabrication and measurements The topics covered here not only promote further research and development of soft actuators but also lead the way to their utilization and industrialization One outstanding feature of the book is that it contains many color figures diagrams and photographs clearly describing the mechanism apparatus and motion of soft actuators The chapter on modeling is conducive to more extensive design work in materials and devices and is especially useful in the development of practical applications Readers can acquire the newest technology and information about the basic science and practical applications of flexible lightweight and noiseless soft actuators which are quite unlike conventional mechanical engines and electric motors The new ideas offered in this volume will provide inspiration and encouragement to researchers and developers as they explore new fields of applications for soft actuators **Actuators and Their Applications** Inamuddin,Rajender Boddula,Abdullah M. Asiri,2020-04-28 As demand has increased for new types of equipment that are

more suited to the ever evolving world of industry demand for both new and traditional types of actuators has soared From automotive and aeronautical to biomedical and robotics engineers are constantly developing actuating devices that are adapted to their particular needs in their particular field and actuators are used in almost every field of engineering that there is This volume not only lays out the fundamentals of actuators such as how they operate the different kinds and their various applications but it also informs the engineer or student about the new actuators that are being developed and the state of the art of actuators Edited and written by highly experienced and well respected engineers with a deep understanding of their subject there is no other volume on actuators that is more current or comprehensive Whether as a guide for the latest innovations in actuators a refresher reference work for the veteran engineer or an introductory text for the engineering student this is a must have for any engineer s or university s library Covering the theory and the practical applications this breakthrough volume is a one stop shop for any engineer or student interested in actuators

Future Power Network and Smart Energy Systems, Volume 2 Rahul Sharma,Amit Kumar,Anmol R. Saxena,2025-09-26 This book features high quality peer reviewed papers from the International Conference on Future Power Network and Smart Energy Systems Issues and Challenges FPNSSES 2023 Organized by the Department of Electrical Engineering at the National Institute of Technology Kurukshetra it includes contributions from academicians technologists entrepreneurs and research scholars The content is designed to benefit engineers students and researchers working in the fields of power networks and smart energy systems

Introduction to Precision Machine Design and Error Assessment Samir Mekid,2008-12-23 While ultra precision machines are now achieving sub nanometer accuracy unique challenges continue to arise due to their tight specifications Written to meet the growing needs of mechanical engineers and other professionals to understand these specialized design process issues Introduction to Precision Machine Design and Error Assessment places

Proceedings of 4th International Conference on ICT for Digital, Smart, and Sustainable Development Md Afshar Alam,Farheen Siddiqui,Sherin Zafar,Imran Hussain,2024-12-26 This book contains original peer reviewed research articles from 4th International Conference on ICT for Digital Smart and Sustainable Development ICIDSSD 2024 organized by Jamia Hamdard Delhi India during 23 24 April 2024 It includes most recent research trends and advancements in sustainable computing sustainable energy consumption governance sustainability and security human built systems for sustainable development sustainable IoT and cyber physical systems big data analytics data science and IoT cloud computing and artificial intelligence

Autonomous Positioning of Piezoactuated Mechanism for Biological Cell Puncture Mingyang Xie,Shengdong Yu,2023-06-02 Autonomous Positioning of Piezoactuated Mechanism for Biological Cell Puncture gives a systematic and almost self contained description of the many facets of advanced design optimization modeling system identification and advanced control techniques for positioning of the cell puncture mechanism with a piezoelectric actuator in micro nanorobotics systems To achieve biomedical applications reliability design modeling and precision control are essential for

developing engineering systems With the advances in mechanical design dynamic modeling system identification and control techniques it is possible to expand the advancements in reliability design precision control and quick actuation of micro nanomanipulation systems to the robot s applications at the micro and nanoscales especially for biomedical applications This book unifies existing and emerging techniques concerning advanced design modeling and advanced control methodologies in micropuncture of biological cells using piezoelectric actuators with their practical biomedical applications The book is an essential resource for researchers within robotics mechatronics biomedical engineering and automatic control society including both academic and industrial parts

KEY FEATURES Provides a series of latest results in including but not limited to design modeling and control of micro nanomanipulation systems utilizing piezoelectric actuators Gives recent advances of theory technological aspects and applications of advanced modeling control and actuation methodologies in cell engineering applications Presents simulation and experimental results to reflect the micro nano manipulation practice and validate the performances of the developed design analysis and synthesis approaches

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In a time characterized by interconnectedness and an insatiable thirst for knowledge, the captivating potential of verbal expression has emerged as a formidable force. Its power to evoke sentiments, stimulate introspection, and incite profound transformations is genuinely awe-inspiring. Within the pages of "**Modeling And Control Of Precision Actuators**," a mesmerizing literary creation penned by way of a celebrated wordsmith, readers attempt an enlightening odyssey, unraveling the intricate significance of language and its enduring affect our lives. In this appraisal, we shall explore the book is central themes, evaluate its distinctive writing style, and gauge its pervasive influence on the hearts and minds of its readership.

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