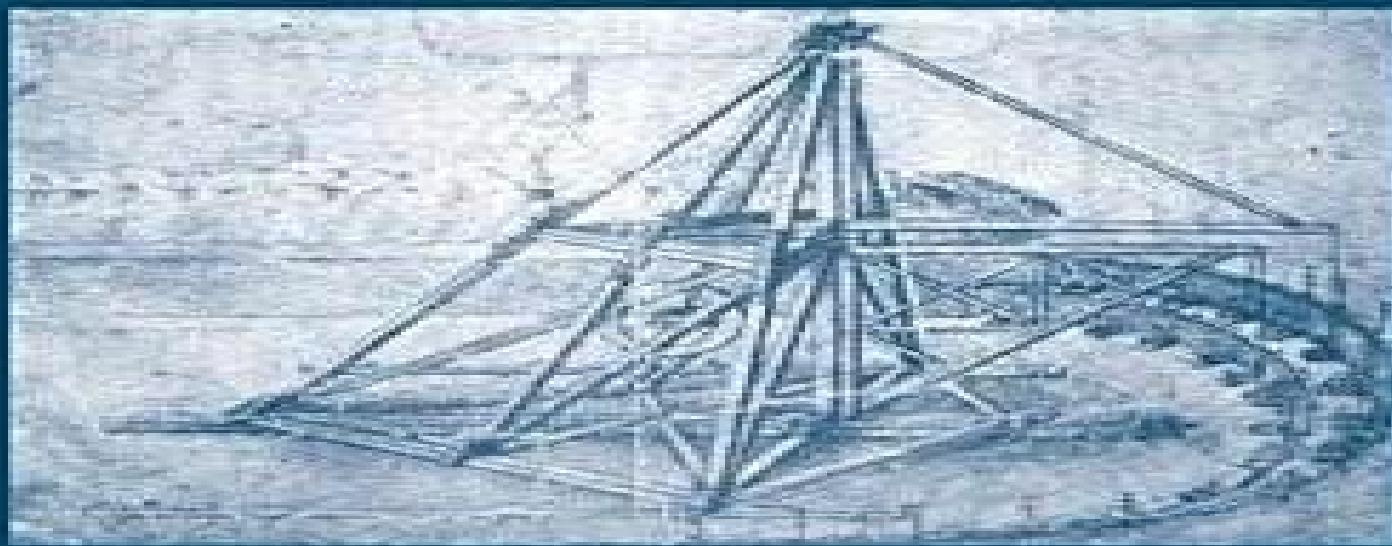


SOLID MECHANICS AND ITS APPLICATIONS

J.-P. Merlet

Parallel Robots
Second Edition



 Springer

Parallel Robots Solid Mechanics And Its Applications

Grigore Gogu

Parallel Robots Solid Mechanics And Its Applications:

Parallel Robots J.-P. Merlet,2012-12-06 Parallel robots are closed loop mechanisms presenting very good performances in terms of accuracy rigidity and ability to manipulate large loads Parallel robots have been used in a large number of applications ranging from astronomy to flight simulators and are becoming increasingly popular in the field of machine tool industry This book presents a complete synthesis of the latest results on the possible mechanical architectures analysis and synthesis of this type of mechanism It is intended to be used by students with over 100 exercises and numerous Internet addresses researchers with over 500 references and anonymous ftp access to the code of some algorithms presented in this book and engineers for which practical results and applications are presented

Structural Synthesis of Parallel Robots

Grigore Gogu,2009-05-01 This is the first book of robotics presenting solutions of uncoupled and fully isotropic parallel robotic manipulators and a method for their structural synthesis Part 1 presents the methodology proposed for structural synthesis Part 2 presents the various topologies of parallel robots generated by this systematic approach Many solutions are presented here for the first time The book will contribute to a widespread implementation of these solutions in industrial products

Intelligent Robotics and Applications Jeschke Sabina,Honghai Liu,Daniel Schilberg,2011-11-29 The two volume set LNAI 7101 and LNAI 7102 constitutes the refereed proceedings of the 4th International Conference on Intelligent Robotics and Applications ICIRA 2011 held in Aachen Germany in November 2011 The 122 revised full papers presented were thoroughly reviewed and selected from numerous submissions They are organized in topical sections on progress in indoor UAV robotics intelligence industrial robots rehabilitation robotics mechanisms and their applications multi robot systems robot mechanism and design parallel kinematics parallel kinematics machines and parallel robotics handling and manipulation tangibility in human machine interaction navigation and localization of mobile robot a body for the brain embodied intelligence in bio inspired robotics intelligent visual systems self optimising production systems computational intelligence robot control systems human robot interaction manipulators and applications stability dynamics and interpolation evolutionary robotics bio inspired robotics and image processing applications

New Advances in

Mechanisms, Mechanical Transmissions and Robotics Burkhard Corves,Erwin-Christian Lovasz,Mathias Hüsing,Inocentiu Maniu,Corina Gruescu,2016-09-30 This volume presents the proceedings of the Joint International Conference of the XII International Conference on Mechanisms and Mechanical Transmissions MTM and the XXIII International Conference on Robotics Robotics 16 that was held in Aachen Germany October 26th 27th 2016 It contains applications of mechanisms and transmissions in several modern technical fields such as mechatronics biomechanics machines micromachines robotics and apparatus In connection with these fields the work combines the theoretical results with experimental testing The book presents reviewed papers developed by researchers specialized in mechanisms analysis and synthesis dynamics of mechanisms and machines mechanical transmissions biomechanics precision mechanics

mechatronics micromechanisms and microactuators computational and experimental methods CAD in mechanism and machine design mechanical design of robot architecture parallel robots mobile robots micro and nano robots sensors and actuators in robotics intelligent control systems biomedical engineering teleoperation haptics and virtual reality

Structural Synthesis of Parallel Robots Grigore Gogu, 2009-02-15 The mathematical investigations referred to bring the whole apparatus of a great science to the examination of the properties of a given mechanism and have accumulated in this direction rich material of enduring and increasing value What is left unexamined is however the other immensely deeper part of the problem the question How did the mechanism or the elements of which it is composed originate What laws govern its building up Is it indeed formed according to any laws whatever Or have we simply to accept as data what invention gives us the analysis of what is thus obtained being the only scientific problem left as in the case of natural history Reuleaux F Theoretische Kinematik Braunschweig Vieweg 1875 Reuleaux F The Kinematics of Machinery London Macmillan 1876 and New York Dover 1963 translated by A B W Kennedy This book represents the second part of a larger work dedicated to the structural synthesis of parallel robots Part 1 already published in 2008 Gogu 2008a has presented the methodology proposed for structural synthesis This book focuses on various topologies of translational parallel robots systematically generated by using the structural synthesis approach proposed in Part 1 The originality of this work resides in the fact that it combines the new formulae for mobility connectivity redundancy and overconstraints and the evolutionary morphology in a unified approach of structural synthesis giving interesting innovative solutions for parallel mechanisms

Advances in Robot Kinematics 2022 Oscar Altzarra, Andrés Kecskeméthy, 2022-06-17 This book reports on the latest scientific achievements on robot kinematics provided by the prominent researchers participating in the 18th International Symposium on Advances in Robot Kinematics ARK2022 organized in the University of the Basque Country Bilbao Spain It is of interest to researchers wanting to know more about the latest topics and methods in the fields of the kinematics control and design of robotic systems The book brings together 53 peer reviewed papers These cover the full range of robotic systems including serial parallel flexible mechanisms and cable driven manipulators and tackle problems such as kinematic analysis of robots robot modelling and simulation theories and methods in kinematics singularity analysis kinematic problems in parallel robots redundant robots cable robots kinematics in biological systems flexible parallel manipulators humanoid robots and humanoid subsystems

Robotics Goes MOOC Bruno Siciliano, 2025-02-04 A robot's appearance and its way of interacting with humans is of fundamental importance Until a few years ago there was a clear asymmetry between the typically excellent performance of industrial robots and their ugly and disharmonious bodies with crude ways and potentially very dangerous movements for the human environment A modern artifact can be as harmonious and beautiful as a complex biological machine or a work of plastic art and thus it should be clear how design plays a key role for robot technology to become a part of our everyday life and change it essentially in a responsible and beneficial manner It is designers who shape the interface

between humans and machines and as such they will contribute to make robots as customizable and intuitively useful to inexperienced users according to a plug and play mode The new concept of robotronics as the mechatronics approach to designing advanced robots is the focus of the first chapter of the second book of the Robotics Goes MOOC project by Asfour et al The main issues for robot manipulator design are covered in the subsequent material namely redundant robots in Chapter 2 by Maciejewsky et al and parallel robots in Chapter 3 by Mller where widely adopted kinematic solutions are presented Then the adoption to flexibility as opposed to the rigid mechanics paradigm is discussed in Chapter 4 by Bertram et al with reference to elastic robots and in Chapter 5 by Laschi focused on soft robotics Somewhat speculating on the previous two design solutions comes Chapter 6 by Cutkosky dealing with bioinspired robots The last part of the book is devoted to robot locomotion namely Chapter 7 by Vendittelli on wheeled robots and Chapter 8 by Harada on biped humanoids

Annals of Scientific Society for Assembly, Handling and Industrial Robotics 2021 Thorsten Schüppstuhl,Kirsten Tracht,Annika Raatz,2022-01-01 This Open Access proceedings presents a good overview of the current research landscape of assembly handling and industrial robotics The objective of MHI Colloquium is the successful networking at both academic and management level Thereby the colloquium focuses an academic exchange at a high level in order to distribute the obtained research results to determine synergy effects and trends to connect the actors in person and in conclusion to strengthen the research field as well as the MHI community In addition there is the possibility to become acquainted with the organizing institute Primary audience is formed by members of the scientific society for assembly handling and industrial robotics WGMHI

New Developments and Advances in Robot Control Nabil Derbel,Jawhar Ghommam,Quanmin Zhu,2019-01-24 This book highlights relevant studies and applications in the area of robotics which reflect the latest research from interdisciplinary theoretical studies and computational algorithm development to representative applications It presents chapters on advanced control such as fuzzy neural backstepping sliding mode adaptive predictive diagnosis and fault tolerant control etc and addresses topics including cloud robotics cable driven robots two wheeled robots mobile robots swarm robots hybrid vehicle and drones Each chapter employs a uniform structure background motivation quantitative development equations case studies illustration tutorial simulations experiences curves tables etc allowing readers to easily tailor the techniques to their own applications

Robotics and Mechatronics Chin-Hsing Kuo,Pei-Chun Lin,Terence Essomba,Guan-Chen Chen,2019-09-26 This book gathers the latest advances innovations and applications in the field of robotics and mechatronics as presented by leading international researchers and engineers at the 6th IFToMM International Symposium on Robotics and Mechatronics ISRM held in Taipei Taiwan on October 28 30 2019 It covers highly diverse topics including mechanism synthesis analysis and design kinematics and dynamics of multibody systems modelling and simulation sensors and actuators novel robotic systems industrial and service related robotics and mechatronics medical robotics and historical developments in robotics and mechatronics The contributions which were selected through a rigorous international

peer review process share exciting ideas that spur novel research directions and foster new multidisciplinary collaborations

Design, Analysis and Control of Cable-Suspended Parallel Robots and Its Applications Bin Zi,Sen Qian,2018-07-14 This book provides an essential overview of the authors work in the field of cable suspended parallel robots focusing on innovative design mechanics control development and applications It presents and analyzes several typical mechanical architectures of cable suspended parallel robots in practical applications including the feed cable suspended structure for super antennae hybrid driven based cable suspended parallel robots and cooperative cable parallel manipulators for multiple mobile cranes It also addresses the fundamental mechanics of cable suspended parallel robots on the basis of their typical applications including the kinematics dynamics and trajectory tracking control of the feed cable suspended structure for super antennae In addition it proposes a novel hybrid driven based cable suspended parallel robot that uses integrated mechanism design methods to improve the performance of traditional cable suspended parallel robots A comparative study on error and performance indices of hybrid driven based and traditional cable suspended parallel robots rounds out the coverage This book addresses the needs of researchers engineers and post graduates in the field of cable suspended parallel robots and related areas

Structural Synthesis of Parallel Robots Grigore Gogu,2013-09-24 This book represents the fifth part of a larger work dedicated to the structural synthesis of parallel robots The originality of this work resides in the fact that it combines new formulae for mobility connectivity redundancy and overconstraints with evolutionary morphology in a unified structural synthesis approach that yields interesting and innovative solutions for parallel robotic manipulators This is the first book on robotics that presents solutions for coupled decoupled uncoupled fully isotropic and maximally regular robotic manipulators with Sch nflies motions systematically generated by using the structural synthesis approach proposed in Part 1 Overconstrained non redundant overactuated redundantly actuated solutions with simple complex limbs are proposed Many solutions are presented here for the first time in the literature The author had to make a difficult and challenging choice between protecting these solutions through patents and releasing them directly into the public domain The second option was adopted by publishing them in various recent scientific publications and above all in this book In this way the author hopes to contribute to a rapid and widespread implementation of these solutions in future industrial products

Structural Synthesis of Parallel Robots Grigore Gogu,2011-10-13 This book represents the fourth part of a larger work dedicated to the structural synthesis of parallel robots Part 1 Gogu 2008a presented the methodology of structural synthesis and the systematisation of structural solutions of simple and complex limbs with two to six degrees of connectivity systematically generated by the structural synthesis approach Part 2 Gogu 2009a presented structural solutions of translational parallel robotic manipulators with two and three degrees of mobility Part 3 Gogu 2010a focussed on structural solutions of parallel robotic manipulators with planar motion of the moving platform This book offers other topologies of parallel robotic manipulators with two and three degrees of freedom systematically generated by using the structural synthesis approach

proposed in Part 1 The originality of this work resides in the fact that it combines the new formulae for mobility connectivity redundancy and overconstraints and the evolutionary morphology in a unified approach of structural synthesis giving interesting innovative solutions for parallel robotic manipulators This is the first book of robotics presenting various solutions of coupled decoupled uncoupled fully isotropic and maximally regular parallel robotic manipulators with two and three degrees of freedom systematically generated by using the structural synthesis approach proposed in Part 1 Non redundant redundant overconstrained isostatic solutions with simple complex limbs actuated by linear rotary actuators with without idle mobilities are proposed Many solutions are presented here for the first time in the literature The author had to make a difficult and challenging choice between protecting these solutions through patents and releasing them directly into the public domain The second option was adopted by publishing them in various recent scientific publications and mainly in this book In this way the author hopes to contribute to a rapid and widespread implementation of these solutions in future industrial products

ROMANSY 16 Teresa Zielinska,Cezary Zielinski,2006-07-20 The book devotes itself to novel robots humanoid and bio robotic problems challenges in control and motion synthesis the kinematical and dynamical analysis of robotic systems perception problems space robots and other promising innovative mechanisms and technologies The authors deal with the problems involved in the coexistence of humans and personal robots providing assistance to people doing housework or to the elderly and the handicapped as well as the robots working with or without human help during space missions To effectively work and cooperate with us robots must exhibit abilities that are comparable to those of humans The book describes the ongoing efforts to design and develop human friendly robotic systems that can safely and effectively interact and work with humans Man's determination to explore outer space has stimulated the progress being made in robotics for it has involved specific requirements limitations and new targets for the designers The aim of this publication is to present the research results in robotics that are now state of the art and indicate the possible future lines of development

Computational Methods in Science and Engineering George Maroulis,Theodore E. Simos,2009-09-02 The aim of ICCMSE 2008 is to bring together computational scientists and engineers from several disciplines in order to share methods methodologies and ideas The potential readers are all the scientists with interest in Computational Mathematics Theoretical Physics Computational Physics Theoretical Chemistry Computational Chemistry Mathematical Chemistry Computational Engineering Computational Mechanics Computational Biology and Medicine Scientific Computation High Performance Computing Parallel and Distributed Computing Visualization Problem Solving Environments Software Tools Advanced Numerical Algorithms Modelling and Simulation of Complex Systems Web based Simulation and Computing Grid based Simulation and Computing Computational Grids and Computer Science Structural Synthesis of Parallel Robots Grigore Gogu,2010-09-08 In other words the invention of a mechanism will be to the scientific kinematist a synthetic problem which he can solve by the use of systematic if also difficult methods Reuleaux F Theoretische Kinematik Braunschweig Vieweg 1875

Reuleaux F The Kinematics of Machinery London Macmillan 1876 and New York Dover 1963 translated by A B W Kennedy This book represents the third part of a larger work dedicated to the structural synthesis of parallel robots Part 1 Gogu 2008a presented the methodology of structural synthesis and the systematisation of structural solutions of simple and complex limbs with two to six degrees of connectivity systematically generated by the structural synthesis approach Part 2 Gogu 2009a presented structural solutions of translational parallel robotic manipulators with two and three degrees of mobility This book focuses on various topologies of parallel robotic manipulators with planar motion of the moving platform systematically generated by using the structural synthesis approach proposed in Part 1 The originality of this work resides in the fact that it combines the new formulae for mobility connectivity redundancy and overconstraints and the evolutionary morphology in a unified approach of structural synthesis giving interesting innovative solutions for parallel mechanisms

Journal of Dynamic Systems, Measurement, and Control ,2007 **Mechanical and Electronics Engineering III**

Han Zhao,2011-10-27 Selected peer reviewed papers from the 2011 3rd International Conference on Mechanical and Electronics Engineering ICME 2011 September 23 25 2011 Hefei China IEEE/ASME International Conference on Advanced Intelligent Mechatronics Proceedings ,2005 **Parallel Robots** J.P. Merlet,2000-07-31 Parallel robots are closed loop mechanisms presenting very good performances in terms of accuracy rigidity and ability to manipulate large loads Parallel robots have been used in a large number of applications ranging from astronomy to flight simulators and are becoming increasingly popular in the field of machine tool industry This book presents a complete synthesis of the latest results on the possible mechanical architectures analysis and synthesis of this type of mechanism It is intended to be used by students with over 100 exercises and numerous Internet addresses researchers with over 500 references and anonymous ftp access to the code of some algorithms presented in this book and engineers for which practical results and applications are presented

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