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| Nota di contenuto | Theory of Parallel Mechanisms; Preface; Contents; Chapter 1: Basics of Screw Theory; 1.1 Introduction; 1.2 Equation of a Line; 1.3 Mutual Moment of Two Lines; 1.4 Line Vectors and Screws; 1.4.1 The Line Vector; 1.4.2 The Screw; 1.5 Screw Algebra; 1.5.1 Screw Sum; 1.5.2 Product of a Scalar and a Screw; 1.5.3 Reciprocal Product; 1.6 Instantaneous Kinematics of a Rigid Body; 1.6.1 Instantaneous Rotation; 1.6.2 Instantaneous Translation; 1.6.3 Instantaneous Screw Motion; 1.7 Statics of a Rigid Body; 1.7.1 A Force Acting on a Body; 1.7.2 A Couple Acting on a Body; 1.7.3 A Twist Acting on a Body ReferencesChapter 2: Dependency and Reciprocity of Screws; 2.1 Concept of Screw Systems; 2.2 Second-Order Screw System; 2.2.1 Linear Combination of Two Screws; 2.2.2 Special Two-Screw System; 2.3 Third-Order Screw System; 2.3.1 Principal Screws; 2.3.2 Special Three-Screw Systems; 2.4 Grassmann Line Geometry; 2.5 Screw Dependency in Different Geometrical Spaces; 2.5.1 Basic Concepts; 2.5.2 Different Geometrical Spaces; 2.6 Reciprocal Screws; 2.6.1 Concept of a Reciprocal Screw; 2.6.2 Dualism in the Physical Meaning of Reciprocal Screws; 2.7 Reciprocal Screw System |

2.8 Reciprocal Screw and Constrained Motion2.8.1 Three Skew Lines in Space; 2.8.2 Three Lines Parallel to a Plane Without a Common Normal; 2.8.3 Three Non-concurrent Coplanar Lines; 2.8.4 Three Coplanar and Concurrent Line Vectors; 2.8.5 Three Line Vectors Concurrent in Space; 2.8.6 Three Line Vectors Parallel in Space; References; Chapter 3: Mobility Analysis Part-1; 3.1 The Concept and Definition of Mobility; 3.2 Mobility Open Issue; 3.2.1 Grubler-Kutzbach Criterion; 3.2.2 Mobility Open Issue; 3.3 Mobility Principle Based on Reciprocal Screw 3.3.1 Mechanism Can Be Expressed as a Screw System3.3.2 Development of Our Unified Mobility Principle; 3.3.3 The Modified G-K Formulas; 3.4 Constraint Analysis Based on Reciprocal Screw; 3.4.1 The Common Constraint; 3.4.2 Parallel Constraint; 3.4.3 Over-Constraint; 3.4.4 The Generalized Kinematic Pair; 3.5 Mobility Property Analyses; 3.5.1 Translation and Rotation; 3.5.2 Rotational Axis; 3.5.3 Instantaneous Mobility and Full-Cycle Mobility; 3.5.4 Full-Field Mobility; 3.5.5 Parasitic Motion; 3.5.6 Self-motion; References; Chapter 4: Mobility Analysis Part-2
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4.3 Mobility Analysis of Modern Parallel Mechanisms

Sommario/riassunto

This book contains mechanism analysis and synthesis. In mechanism analysis, a mobility methodology is first systematically presented. This methodology, based on the author's screw theory, proposed in 1997, of which the generality and validity was only proved recently,  is a very complex issue, researched by various scientists over the last 150 years. The principle of kinematic influence coefficient and its latest developments are described. This principle is suitable for kinematic analysis of various 6-DOF and lower-mobility parallel manipulators. The singularities are classified by a new point of view, and progress in position-singularity and orientation-singularity is stated. In addition, the concept of over-determinate input is proposed and a new method of force analysis based on screw theory is presented. In mechanism synthesis, the synthesis for spatial parallel mechanisms is discussed, and the synthesis method of difficult 4-DOF and 5-DOF symmetric mechanisms, which was first put forward by the author in 2002, is introduced in detail. Besides, the three-order screw system and its space distribution of the kinematic screws for infinite possible motions of lower mobility mechanisms are both analyzed.