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Nota di contenuto

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2.1. Formats for Physical Relations 2.2. Classification of Physical Quantities; Chapter 3. Dimensional Systems; 3.1. General Statements; 3.2. Classification; 3.3. The SI; 3.4. Other Than SI Dimensional Systems; 3.5. A Note on the Classification of Dimensional Systems; Chapter 4. Transformation of Dimensions; 4.1. Numerical Equivalences; 4.2. Technique; 4.3. Examples; 4.4. Problems; Chapter 5. Arithmetic of Dimensions; Chapter 6. Dimensional Homogeneity; 6.1. Equations; 6.2. Graphs; 6.3. Problems; Chapter 7. Structure of Physical Relations; 7.1. Monomial Power Form; 7.2. The Dimensional Matrix
7.3. Generating Products of Variables of Desired Dimension 7.4. Number of Independent Sets of Products of Given Dimension (I); 7.5. Completeness of the Set of Products of Variables; 7.6. Special Case: Matrix A is Singular; 7.7. Number of Independent Sets of Products of Given Dimension (II); Buckingham's Theorem; 7.8. Selectable and Nonselectable Dimensions in a Product of Variables; 7.9. Minimum Number of Independent Products of Variables of Given Dimension; 7.10. Constancy of the Sole Dimensionless Product; 7.11. Number of Dimensions Equals or Exceeds the Number of Variables; 7.12. Problems
Chapter 8. Systematic Determination of Complete Set of Products of Variables 8.1. Dimensional Set; Derivation of Products of Variables of a Given Dimension; 8.2. Checking the Results; 8.3. The Fundamental Formula; Chapter 9. Transformations; 9.1. Theorems Related to Some Specific Transformations; 9.2. Transformation Between Systems of Different Matrices; 9.3. Transformation Between Dimensional Sets; 9.4. Independence of Dimensionless Products of the Dimensional System Used; Chapter 10. Number of Sets of Dimensionless Products of Variables; 10.1. Distinct and Equivalent Sets
10.2. Changes in a Dimensional Set Not Affecting the Dimensionless Variables 10.3. Prohibited Changes in a Dimensional Set; 10.4. Number of Distinct Sets; 10.5. Exceptions; 10.6. Problems; Chapter 11. Relevancy of Variables; 11.1. Dimensional Irrelevancy; 11.2. Physical Irrelevancy; 11.3. Problems; Chapter 12. Economy of Graphical Presentation; 12.1. Number of Curves and Charts; 12.2. Problems; Chapter 13. Forms of Dimensionless Relations; 13.1. General Classification; 13.2. Monomial is Mandatory; 13.3. Monomial is Impossible-Proven; 13.4. Monomial is Impossible- Not Proven
13.5. Reconstructions

Sommario/riassunto

Applied Dimensional Analysis and Modeling provides the full mathematical background and step-by-step procedures for employing dimensional analyses, along with a wide range of applications to problems in engineering and applied science, such as fluid dynamics, heat flow, electromagnetics, astronomy and economics. This new edition offers additional worked-out examples in mechanics, physics, geometry, hydrodynamics, and biometry.* Covers 4 essential aspects and applications: - principal characteristics of dimensional systems - applications of dimensional techniques in engine