Introduction to Dynamics and Control in Mechanical Engineering Systems. Wiley-ASME Press Series

Description: An introductory textbook covering dynamics and controls of engineering systems, with particular focus on mechanical engineering systems

- Presents and illustrates the process of translating systems in the physical world to mathematical models in the conceptual world during the derivations of equations of motion
- Includes problems and solutions
- Contains a separate chapter for operating principles of sensors or transducers and their equations of motion
- Covers graphical methods for control system analysis and design
- Presents modern control system analysis as a foundation for a second or graduate course in control engineering
- Includes applications of MATLAB® for numerical solutions to various questions in system dynamics in order to verify exact solutions and enhance understanding as well as interpretation of solutions

Contents:

Preface xiii

Acknowledgements xv

1. Introduction 1

1.1 Important Difference between Static and Dynamic Responses 1

1.2 Classification of Dynamic Systems 1

1.3 Applications of Control Theory 3

1.4 Organization of Presentation 4

References 6

2. Review of Laplace Transforms 7

2.1 Definition 7

2.2 First and Second Shifting Theorems 10

2.3 Dirac Delta Function (Unit Impulse Function) 10

2.4 Laplace Transforms of Derivatives and Integrals 10

2.5 Convolution Theorem 11

2.6 Initial and Final Value Theorems 12

2.7 Laplace Transforms of Periodic Functions 12

2.8 Partial Fraction Method 13

2.9 Questions and Solutions 15

2.10 Applications of MATLAB 19

References 25
7.4 Principle and Applications of Piezoelectric Hydrophone 144
7.5 Questions and Solutions 146
References 150
Exercise Questions 150
8. Fundamentals of Control Systems 153
8.1 Classification of Control Systems 154
8.2 Representation of Control Systems 154
8.3 Transfer Functions 154
8.3.1 Transfer functions of elements in cascade connection 155
8.3.2 Transfer functions of elements in parallel connection 156
8.3.3 Remarks 156
8.4 Closed-Loop Control Systems 157
8.4.1 Closed-loop transfer functions and system response 157
8.4.2 Summary of steps for determination of closed-loop transfer functions 160
8.5 Block Diagram Reduction 160
8.5.1 Moving starting points of signals 160
8.5.2 Moving summing points 161
8.5.3 System transfer function by block diagram reduction 161
8.6 Questions and Solutions 163
References 170
Exercise Questions 170
9.1 Response in Time Domain 173
9.2 Transient Responses As Functions of Closed-Loop Poles 175
9.3 Control System Design Based on Transient Responses 175
9.4 Control Types 179
9.4.1 Proportional control 180
9.4.2 Integral control 181
9.4.3 Derivative control 181
9.5 Steady State Errors 182
9.5.1 Unit step input 182
12. Modern Control System Analysis 267
12.1 State Space Method 267
12.2 State Transition Matrix 268
12.3 Relationship between Laplace Transformed State Equation and Transfer Function 269
12.4 Stability Based on Eigenvalues of Coefficient Matrix 272
12.5 Controllability and Observability 276
12.6 Stabilizability and Detectability 281
12.7 Applications of MATLAB 281
Appendix 12A Solution of System of First Order Differential Equations 291
Appendix 12B Maclaurin Series 296
Appendix 12C Rank of A Matrix 298
References 298
Exercise Questions 299
Index 301

Ordering:
Order Online - http://www.researchandmarkets.com/reports/3335832/
Order by Fax - using the form below
Order by Post - print the order form below and send to

Research and Markets,
Guinness Centre,
Taylors Lane,
Dublin 8,
Ireland.
RESEARCH ANDMARKETS  Page 1 of 2

Fax Order Form
To place an order via fax simply print this form, fill in the information below and fax the completed form to 646-607-1907 (from USA) or +353-1-481-1716 (from Rest of World). If you have any questions please visit [http://www.researchandmarkets.com/contact/](http://www.researchandmarkets.com/contact/)

Order Information
Please verify that the product information is correct.

- **Product Name:** Introduction to Dynamics and Control in Mechanical Engineering Systems. Wiley-ASME Press Series
- **Web Address:** [http://www.researchandmarkets.com/reports/3335832/](http://www.researchandmarkets.com/reports/3335832/)
- **Office Code:** SCPLYN1B

Product Format
Please select the product format and quantity you require:

- **Hard Copy (Hard Back):** USD 103 + USD 28 Shipping/Handling

* Shipping/Handling is only charged once per order.

Contact Information
Please enter all the information below in **BLOCK CAPITALS**

- **Title:** [Mr] [Mrs] [Dr] [Miss] [Ms] [Prof]
- **First Name:** ___________________________  **Last Name:** ___________________________
- **Email Address:** * ___________________________
- **Job Title:** ___________________________
- **Organisation:** ___________________________
- **Address:** ___________________________
- **City:** ___________________________
- **Postal / Zip Code:** ___________________________
- **Country:** ___________________________
- **Phone Number:** ___________________________
- **Fax Number:** ___________________________

* Please refrain from using free email accounts when ordering (e.g. Yahoo, Hotmail, AOL)
Payment Information

Please indicate the payment method you would like to use by selecting the appropriate box.

☐ Pay by credit card: You will receive an email with a link to a secure webpage to enter your credit card details.

☐ Pay by check: Please post the check, accompanied by this form, to:

Research and Markets,
Guinness Center,
Taylors Lane,
Dublin 8,
Ireland.

☐ Pay by wire transfer: Please transfer funds to:

<table>
<thead>
<tr>
<th>Account number</th>
<th>833 130 83</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sort code</td>
<td>98-53-30</td>
</tr>
<tr>
<td>Swift code</td>
<td>ULSBIE2D</td>
</tr>
<tr>
<td>IBAN number</td>
<td>IE78ULSB98533083313083</td>
</tr>
<tr>
<td>Bank Address</td>
<td>Ulster Bank, 27-35 Main Street, Blackrock, Co. Dublin, Ireland.</td>
</tr>
</tbody>
</table>

If you have a Marketing Code please enter it below:

Marketing Code: 

Please note that by ordering from Research and Markets you are agreeing to our Terms and Conditions at http://www.researchandmarkets.com/info/terms.asp

Please fax this form to:

(646) 607-1907 or (646) 964-6609 - From USA
+353-1-481-1716 or +353-1-653-1571 - From Rest of World