Process Identification and PID Control

Description: Process Identification and PID Control enables students and engineers to understand the essential concepts of feedback control, process identification, autotuning, and design of real feedback controllers, especially PID controllers. Sung, Lee, and Lee introduce the fundamentals of process control and dynamics, analysis tools (Bode plot, Nyquist plot), PID controllers and tuning, controller designs, along with the advances control strategies which have been widely used in industry. Included are numerous numerical examples and MATLAB codes to aid the reader in solving real problems. Readers will be able to design their own controllers, implement them, and confirm performance in real-time using real-time virtual processes.

Combines the basics with recent research, helping the novice grasp advanced topics

Brings several industrially important topics together:
- Finishing topics with implementation codes
- Process identification and implementation
- PID controller tuning and implementation
- Enhanced control strategies and implementation

Includes all source codes and real-time virtual processes for self-practice and modeling/controller design courses

Contains problems at the end of every chapter

Written by a team of recognized experts in the area

Process Identification and PID Control is ideal for undergraduate and graduate students in process control, advanced process control, and process identification. Practicing control engineers and R&D personnel in refineries and chemical plants will find this book to be a key reference. Professionals in industry in particular will appreciate the techniques for developing process identification and control software, as well as implementing microprocessor controllers.

Source code for readers and course supplements for instructors available at <a href="company website

Contents: Preface.

Part One Basics of Process Dynamics.

1 Mathematical Representations of Linear Processes.
1.1 Introduction to Process Control and Identification.
1.2 Properties of Linear Processes.
1.3 Laplace Transform.
1.4 Transfer Function and State-Space Systems.

Problems.

2 Simulations.
2.1 Simulating Processes Composed of Differential Equations.
2.2 Simulating Processes Including Time Delay.
2.3 Simulating Closed–Loop Control Systems.

2.4 Useful Numerical Analysis Methods.

Problems.

3 Dynamic Behavior of Linear Processes.

3.1 Low–Order Plus Time–Delay Processes.

3.2 Process Reaction Curve Method.

3.3 Poles and Zeroes.

3.4 Block Diagram.

3.5 Frequency Responses.

Problems.

Part Two Process Control.

4 Proportional   Integral   Derivative Control.

4.1 Structure of Proportional   Integral   Derivative Controllers and Implementation in Computers/Microprocessors.

4.2 Roles of Three Parts of Proportional   Integral   Derivative Controllers.

4.3 Integral Windup.

4.4 Commercial Proportional   Integral   Derivative Controllers.

Problems.

5 Proportional   Integral   Derivative Controller Tuning.

5.1 Trial–and–Error Tuning.

5.2 Simple Process Identification Methods.

5.3 Ziegler   Nichols Tuning Rule.

5.4 Internal Model Control Tuning Rule.

5.5 Integral of the Time–Weighted Absolute Value of the Error Tuning Rule for a First–Order Plus Time–Delay Model (ITAE-1).

5.6 Integral of the Time–Weighted Absolute Value of the Error Tuning Rule for a Second–Order Plus Time–Delay Model (ITAE-2).


5.8 Model Reduction Method for Proportional   Integral   Derivative Controller Tuning.

5.9 Consideration of Modeling Errors.

5.10 Concluding Remarks.

Problems.

6 Dynamic Behavior of Closed–Loop Control Systems.
6.1 Closed–Loop Transfer Function and Characteristic Equation.
6.2 Bode Stability Criterion.
6.3 Nyquist Stability Criterion.
6.4 Gain Margin and Phase Margin.
Problems.
7 Enhanced Control Strategies.
7.1 Cascade Control.
7.2 Time–Delay Compensators.
7.3 Gain Scheduling.
7.4 Proportional Integral Derivative Control using Internal Feedback Loop.
Problems.
Part Three Process Identification.
8.1 Fourier Series.
8.2 Frequency Response Analysis and Autotuning.
8.3 Describing Function Analysis.
8.4 Fourier Analysis.
8.5 Modified Fourier Transform.
8.6 Frequency Response Analysis with Integrals.
Problems.
9.1 Identification Methods Using Integral Transforms.
9.2 Prediction Error Identification Method.
Problems.
10.2 Prediction Error Identification Method for the Autoregressive Exogenous Input Model.
10.3 Prediction Error Identification Method for the Output Error Model.
10.4 Concluding Remarks.
Problems.
11 Model Conversion from Discrete–Time to Continuous–Time Linear Models.
11.1 Transfer Function of Discrete–Time Processes.

11.2 Frequency Responses of Discrete–Time Processes and Model Conversion.

Problems.

Part Four Process Activation.

12 Relay Feedback Methods.

12.1 Conventional Relay Feedback Methods.

12.2 Relay Feedback Method to Reject Static Disturbances.

12.3 Relay Feedback Method under Nonlinearity and Static Disturbances.


Problems.

13 Modifications of Relay Feedback Methods.


Problems.

Appendix Use of Virtual Control System.

A.1 Setup of the Virtual Control System.

A.2 Examples.

Index.


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.
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/

Order Information
Please verify that the product information is correct.

Product Name: Process Identification and PID Control
Web Address: http://www.researchandmarkets.com/reports/1055182/
Office Code: SCDKA7V6

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

<table>
<thead>
<tr>
<th>Quantity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard Copy (Hard Back):</td>
<td>USD 151 + USD 29 Shipping/Handling</td>
</tr>
</tbody>
</table>

* 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:
Account number 833 130 83
Sort code 98-53-30
Swift code ULSBIE2D
IBAN number IE78ULSB98533083313083
Bank Address Ulster Bank,
27-35 Main Street,
Blackrock,
Co. Dublin,
Ireland.

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