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proper systems; 2.5.4. Frequency response; 2.6. Diagrams and their algebra; 2.6.1. Diagram of a control system; 2.6.2. General algebra of diagrams; 2.6.3. Specificity of linear systems; 2.7. Exercises; Chapter 3. Open-Loop Systems; 3.1. Stability and static gain; 3.1.1. Stability; 3.1.2. Static gain
3.2. First-order systems3.2.1.Transfer function; 3.2.2. Time domain responses; 3.2.3. Frequency response; 3.2.4. Bode plot; 3.2.5. Case of an unstable first-order system; 3.3. Second-order systems; 3.3.1. Transfer function; 3.3.2. Time domain responses; 3.3.3. Bode plot; 3.4. Systems of any order; 3.4.1. Stability; 3.4.2. Decomposition of the transfer function; 3.4.3. Asymptotic Bode plot; 3.4.4. Amplitude/phase relation; 3.5. Time-delay systems; 3.5.1. Left formtime-delay systems; 3.5.2. Transfer function; 3.5.3. Bode plot; 3.5.4. Example: first-order time-delay system
3.5.5. Approximations of a time-delay system3.6. Exercises; Chapter 4. Closed-Loop Systems; 4.1. Closed-loop stability; 4.1.1. Standard feedback system; 4.1.2. Closed-loop equations; 4.1.3. Stability of a closed-loop system; 4.1.4. Nyquist criterion; 4.1.5. Small gain theorem; 4.2. Robustness and performance; 4.2.1. Generalities; 4.2.2. Robustness margins; 4.2.3. Use of the Nichols chart; 4.2.4. Robustness against neglected dynamics; 4.2.5. Performance; 4.2.6. Sensitivity to measurement noise; 4.2.7. Loopshaping of L(s); 4.2.8. Degradation of robustness/performance trade-off
4.2.9. *Extension to the MIMOcase

Sommario/riassunto

Linear systems have all the necessary elements (modeling, identification, analysis and control), from an educational point of view, to help us understand the discipline of automation and apply it efficiently. This book is progressive and organized in such a way that different levels of readership are possible. It is addressed both to beginners and those with a good understanding of automation wishing to enhance their knowledge on the subject. The theory is rigorously developed and illustrated by numerous examples which can be reproduced with the help of appropriate computation software. 60 exe