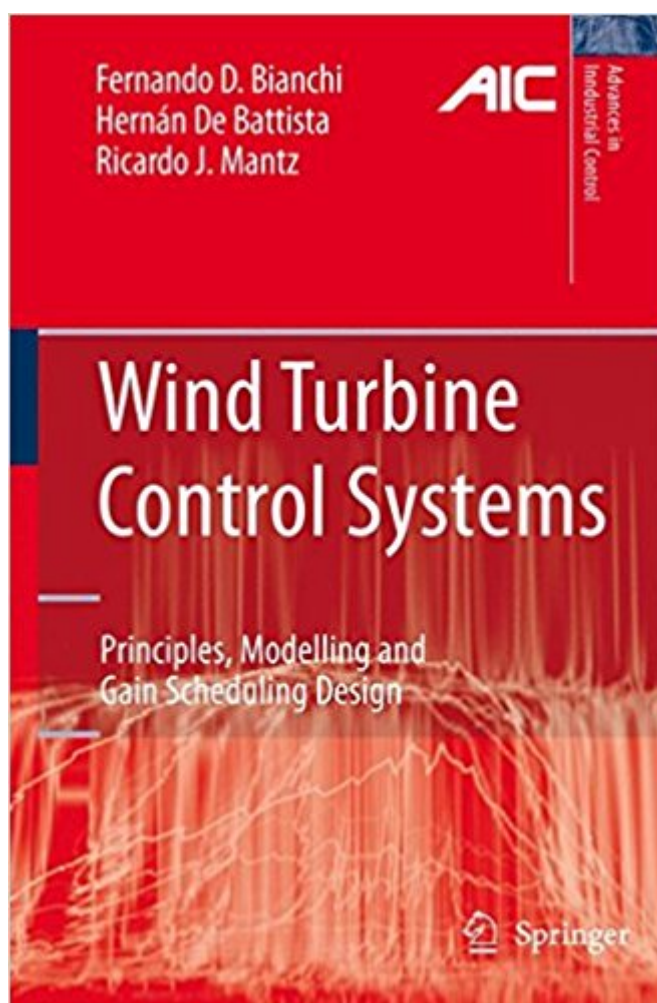


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# Wind Turbine Control Systems: Principles, Modelling And Gain Scheduling Design (Advances In Industrial Control)



## Synopsis

This book emphasizes the application of Linear Parameter Varying (LPV) gain scheduling techniques to the control of wind energy conversion systems. This reformulation of the classical problem of gain scheduling allows straightforward design procedure and simple controller implementation. From an overview of basic wind energy conversion, to analysis of common control strategies, to design details for LPV gain-scheduled controllers for both fixed- and variable-pitch, this is a thorough and informative monograph.

## Book Information

Series: Advances in Industrial Control

Hardcover: 208 pages

Publisher: Springer; 2007 edition (July 12, 2006)

Language: English

ISBN-10: 1846284929

ISBN-13: 978-1846284922

Product Dimensions: 6.1 x 0.6 x 9.2 inches

Shipping Weight: 1.1 pounds (View shipping rates and policies)

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## Customer Reviews

From the reviews: "The book in my hand is the first completely dedicated to the control of wind energy systems; more precisely, it addresses a specific control design approach, the gain scheduling. This monograph is addressed mainly to scientists from academia, but the reader can perceive its utility for industrials as well. I feel that this book has achieved what the authors set out to do." (Iulian Munteanu, International Journal of Robust and Nonlinear Control, Vol. 18, 2008) "The authors of Wind Turbine Control Systems are knowledgeable about the subject, having published several papers in this area. Wind Turbine Control Systems provides a good introduction to wind energy for control engineers. The target audience for this text is members of the control research community who are interested in wind energy applications. provides an overview of wind turbines with an emphasis on various control objectives and LPV-based strategies

for control. • (Kathryn E. Johnson, IEEE Control Systems Magazine, Vol. 27 (5), October, 2007)

Modern wind turbines generally operate at variable speed in order to maximise the conversion efficiency below rated power and to reduce loading on the drive-train. In addition, pitch control of the blades is usually employed to limit the energy captured during operation above rated wind speed. The higher complexity of variable-speed variable-pitch turbines is offset by the benefits of control flexibility, namely, higher conversion efficiency, better power quality, longer useful life; because of the immediate impact of control on the cost of wind energy, reliable high-performance controllers are essential in making wind technology competitive. In *Wind Turbine Control Systems* the application of linearparameter varying (LPV) gain scheduling techniques to the control of wind energy conversion systems is emphasised. This recent reformulation of the classical gain scheduling problem allows a straightforward design procedure and simple controller implementation. The monograph provides a thorough coverage of wind turbine control, including: • an overview of the principles of wind energy conversion; • the control-oriented modelling of wind turbines; • an in-depth analysis of the most common control strategies; • the design of LPV gain-scheduled controllers for both fixed- and variable-pitch, variable-speed wind turbines. *Wind Turbine Control Systems* is primarily intended for researchers and students with a control background wishing to expand their knowledge of wind energy systems. The book will be useful to scientists in the field of control theory looking to apply their innovative control ideas to this appealing control problem and will also interest practising engineers dealing with wind technology who will benefit from the comprehensive coverage of the theoretic control topics, the simplicity of the models and the use of commonly available control algorithms. • • *Advances in Industrial Control* aims to report and encourage the transfer of technology in control engineering. The rapid development of control technology has an impact on all areas of the control discipline. The series offers an opportunity for researchers to present an extended exposition of new work in all aspects of industrial control.

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