

Book Review[®] of Two Related Books on Electric Drives

1. Ned Mohan, *Electric Drives: An Integrative Approach*, 2003 ed. Minneapolis: www.MNPERE.com, 2003, 464 pp., ISBN-0-9715292-1-3.
2. Ned Mohan, *Advanced Electric Drives: Analysis, Control and Modeling using Simulink[®]* Minneapolis: www.MNPERE.com, 2001, 184 pp., ISBN 0-9715292-0-5.

Professor Ned Mohan of the University of Minnesota has written a two-volume series of textbooks on electric drives. The books represent viewpoints from many colleagues, especially due to the feedback from the participants in six National-Science-Foundation-sponsored educational workshops that Dr. Mohan has organized, starting in 1991, in the fields of Power Electronics and Electric Drives. These two excellent books, where the students need no prior knowledge of electric machines theory, are designed to teach from basics to advanced topics in electric machines and drives in only two semesters. In writing these books, the author has paid a great deal of attention to generate student interest, and at the same time to provide them with a solid foundation in the field of Electric Drives, without any prior knowledge of Electric Machine Theory.

The first book in this series, *Electric Drives: An Integrative Approach*, discusses modern adjustable-speed drives in the context of exciting applications such as energy conservation, wind energy, hybrid-electric vehicles, etc. The steady-state analysis of electric drives in this book uses electric machine models that are derived from simple physical principles with minimum amount of mathematics, hence are very easy to understand. These models (unlike in any other book) provide complete continuity to advanced topics discussed in the next book. This introductory book is now adopted as a textbook at a large number of universities around the world.

In the second book in this series, *Advanced Electric Drives: Analysis, Control and Modeling using Simulink[®]*, steady-state models of electric machines are extended to the study of advanced topics such as dynamic analysis, control and modeling of electric drives using Simulink. Simulink-based design examples included in this book (also on the CD-rom attached to the book) allow meaningful design-oriented problems to be assigned as homework. I imagine that students will find the confirmation of analytical discussion by simulation results extremely satisfying.

The approach of the author in these two textbooks is totally unique and represents a sharp departure from that in traditional text-

books now in use for several decades. In the traditional approach, for example, induction motors are first discussed for line-fed operation and only in later chapters their operation for speed control is discussed. In the approach used by the author, electric machines are introduced on the premise that they will be operated in a controlled manner through power electronics, albeit discussed in their steady state in the first of the two-volume series. This approach has two distinct advantages:

1. It allows electric machines to be introduced in the context of exciting applications of electric drives to generate student interest. A large increase in student enrollment is documented at schools that have tried this way of teaching.

2. Electric machines are analyzed in the first textbook in a manner that reveals the physical basis on which they operate, thus allowing a clear understanding of how they ought to be controlled for optimum performance as discussed in the second textbook. The author has succeeded in making the space-vector theory approachable to undergraduates in the first introductory course, in fact, making it easier than phasor calculations by providing physical meaning to space vectors. The author, to his credit, also satisfies those looking for tradition equivalent circuits of machines for line-fed operation.

In addition to the traditional Solutions Manual for instructors of the back-of-the-chapter problems, these two textbooks are accompanied by unusual teaching aids. Each of these textbooks contains a CD-rom with a large number of PowerPoint[®]-based slides that students can print and bring to classes to take notes on, and to quickly review the material before exams. That's not all – the Instructor's CD (only for instructors) contains audio clips, usually a minute or two long attached to each slide, that highlight the pitfalls to be avoided and the main points to be emphasized in class. Instructors using this approach will find these CDs extremely useful in preparing and organizing their lectures. The second textbook also contains the Simulink files of the design examples.

In summary, I strongly recommend all engineering educators in this field to evalu-

ate these two textbooks for themselves. I believe that they (and their students) will be pleasantly surprised.

Given the emphasis on applications, these books are equally valuable for self-learning to practicing engineers who wish to control machines for optimum performance in various applications.

Reviewed by Tore M. Undeland (<http://www.elkraft.ntnu.no/~undeland/>), who is a professor in Power Electronics at the Norwegian University of Science and Technology, NTNU, Trondheim, Norway, and an adjunct professor in Electrical Power Engineering at Chalmers University of Technology, Gothenburg, Sweden. An IEEE Fellow, he is also a scientific advisor to SINTEF Energy Research.



Editor's note: Believing there is value from personal referrals in selecting great books from among the good, we occasionally publish book reviews in the PELS Newsletter. You are invited to contribute a book review to the series. Please send the editor <pelsnews@ieee.org> a short prioritized list of outstanding technical books for which you could write a review to share with your colleagues.

PESC[®] 2008 Call for Proposals

The location of PESC 2008 will be decided at PESC 2003 in Acapulco, Mexico. In keeping with tradition, the 2008 conference would be held normally in Europe (Region 8).

A proposal outline for PESC 2008 should be submitted by May 16, 2003 to the PESC Steering Committee Chair via the PELS Executive Director, Bob Myers <bob.myers@ieee.org>. The proposal should include: local conference facilities, name of proposed General Chair, and outline of budget. Each PESC 2008 proposer should plan to make a short presentation to the PESC Steering Committee in Acapulco on Sunday, June 15, 2003.

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