

Preface

This book is intended for undergraduate and graduate students in electrical and other engineering disciplines as well as for professionals in related fields. It is assumed that the reader has already completed electrical circuit and electronics courses covering basic concepts such as Ohm's, Kirchhoff's, Ampere's and Faraday's laws, Norton and Thevenin equivalent circuits, Fourier analysis, and the characteristics of diodes and transistors. This text combines these technologies and can serve as an introduction for an undergraduate course – where the prerequisites are circuits and electronic analyses – and as a first graduate course on renewable energy. The top-down approach introduces the systems first in terms of block diagrams and then proceeds to analyze each component. Rudimentary mechanical, chemical, aeronautical, and electrical principles are assumed to be known to the reader. Application examples highlight conventional and renewable energy problems. Software programs such as Mathematica, Spice and Matlab are applied to solve component and system problems.

This book has evolved from the content of courses given by the authors at the University of Colorado at Boulder, the Iran University of Science and Technology at Tehran, and the Curtin University of Technology at Perth, Australia. It is suitable for both electrical and non-electrical engineering students and has been particularly written for students or practicing engineers who want to educate themselves through the inclusion of about 170 application examples with solutions. More than 350 references are cited, mostly journal and conference papers as well as national and international standards and guidelines. The International System (SI) of units has been used throughout with some reference to the American/English system of units.

Figure 1 below – indicating the reversal of Arctic cooling trend as published in the Science 325 article “Recent Warming Reverses Long-Term Arctic Cooling,” by Darrell S. Kaufman et al. [1] – graphically captures our rationale for writing this book. Historical temperatures as found by Mann et al. and Moberg et al. are plotted together in graph G with recent findings as documented in [2, 3]. Trend line F indicates Arctic cooling for most of the last 2,000 years, explained by a shift in the Earth's elliptical orbit of the sun. However, the cooling has been overwhelmed in the last century by human-caused global warming.

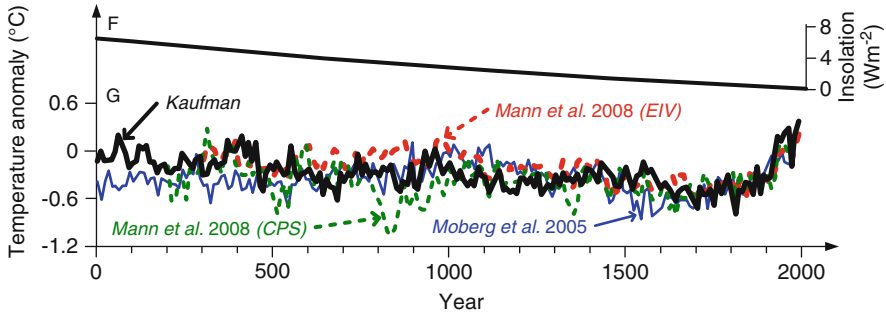


Fig. 1 Reversal of Arctic cooling trend during the past (AD) 2,000 years (From [1])

Key Features:

- Provides theoretical and practical insight into renewable energy problems.
- 170 practical application (example) problems with solutions, some implemented in PSpice, Mathematica, and Matlab.
- A total of 122 problems at the end of the chapters dealing with practical applications.

Boulder, CO
Perth, WA
August 2010

Ewald F. Fuchs
Mohammad A.S. Masoum

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<http://www.springer.com/978-1-4419-7978-0>

Power Conversion of Renewable Energy Systems

Fuchs, E.F.; Masoum, M.A.S.

2011, XIII, 692 p. 120 illus., Hardcover

ISBN: 978-1-4419-7978-0