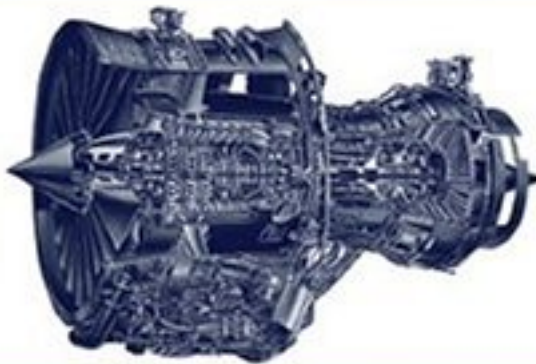




FLUID MECHANICS AND THERMODYNAMICS OF TURBOMACHINERY

FIFTH EDITION



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became apparent this was really only a matter of approach. In this book on wind turbines has been added, which deals with the basic aerodynamics of the turbine rotor. This chapter offers the student a short basic course dealing with the potential fluid mechanics of the machine, together with numerous worked examples at various levels of difficulty. Important aspects concerning the criteria for site selection and blade manufacture, control methods for regulating power output and performance testing are touched upon. Also included are some chapters concerning public and environmental issues which are becoming increasingly important as they, ultimately, can affect the development of wind turbine technology. Of some regret that many aspects of the nature of the wind, e.g. methods for determining the average wind speed, frequency distribution, power law exponent and elevation (and location), cannot be included, as constraints on book length were considered.

The world is becoming increasingly concerned with the very nature of energy surrounding the use of various forms of energy. The ever-growing demand for energy, the undeniably diminishing amount of oil available, global warming and the increased levels of CO₂ and the related threat of rising sea levels are all becoming major issues. Governments, scientific and engineering organisations as well as (small) businesses are now striving to change the profile of energy usage in many countries throughout the world by helping to build or adopt renewable energy sources for their power or heating needs. Almost everywhere there is evidence of the construction of wind turbine farms and plans for even more. Many countries (Denmark, Holland, Germany, India, etc.) are aiming to have between 20% and 30% of their installed power generated from renewable energy sources by 2020. The main burden for this shift is expected to come from wind power. It is the purpose of this new chapter to instruct the students faced with the task of understanding the characteristics and science of wind turbines.

Renewable energy topics were added to the fourth edition of this book, including a Wells turbine and a new chapter on hydraulic turbines. Some of the new developments in Wells turbine have now been added to the chapters on axial flow and vertical axis turbines. It is likely that some of these new developments will flourish and become a major source of renewable energy once sufficient investment is given to them.

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