
In the field of large-scale power generation, the steam turbine occupies a central position whether the energy source is a fossil-fueled boiler, a gas-cooled nuclear reactor, a light or heavy water reactor, a fast reactor, or, looking ahead, even a nuclear fusion reactor. The high cost of fossil fuels, however, and the high capital cost of nuclear systems makes it increasingly important to convert the liberated heat-energy to mechanical power as efficiently as possible. This volume describes key developments in the quest for higher turbine efficiency.

The 1970s saw the expansion of turbine size, reaching unit outputs of up to 1300 MW. In contrast, the downturn in world economic growth in the 1980s has resulted in a sharp reduction in orders for new machines and many utilities are taking steps to extend the life of older turbines. An essential element of the life extension exercise is the retrofitting of new components, using the latest design theories, to improve efficiency. Such schemes have been found highly cost-beneficial.

Prime candidates for retrofitting are the low-pressure turbine and condenser where, as unit sizes have increased, the aerothermodynamic design problems have been more difficult than in other parts of the machine. For these reasons the von Karman Institute has brought together experts in the field of low-pressure turbine and condenser research to provide advanced Lecture Series in these subjects. This volume is a selection of edited lectures from these Series. The lecturers, from Europe and the U.S.A., are specialists in their particular fields of research and development and this book is intended to provide students, researchers, and turbine plant designers with a view of the improvements in knowledge and techniques in recent years. Particularly significant, for example, are the emergence of theories for viscous compressible flow and the capability to measure steam wetness fraction, as described in Chapters 3 and 6, respectively, which must lead to further advances in turbine performance in the future.

By including the fluid mechanics of the turbine and condenser, this publication complements the previous von Karman Institute book “Two Phase Steam Flow in Turbines and Separators” edited by M. J. Moore and C. H. Sieverding (Hemisphere, 1976) and adds significantly to the treatment of wet steam flow in turbines.

I. E. Idelchik
(from Author's Preface)

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