starting and running performance of a small scale Wells turbine are:

(1) The starting torque can be considerably increased by using thick aerofoil sections for the rotor. Modified aerofoil blades with the maximum thickness nearer to the leading edge also produce similar effects.
(2) The NACA 0021 blades produced the maximum peak efficiency and this could be further improved by modifying the profile shape.
(3) The effect of leading edge roughness is a slight degradation in the turbine performance over the whole range of operation. A reduction in the peak efficiency of about 10% can result with the blades completely covered with roughness.

Acknowledgements

The authors wish to thank the UK Department of Energy for the financial assistance towards these investigations. Thanks are also due to the members of the Wave Energy Group for their assistance.

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BOOK REVIEW

Heat Flow Through Extended Surface Heat Exchangers

M. Manzoor

One notes with gratification that the publisher of this book has established a procedure where new developments in fields of engineering emphasising the application of methods in engineering analysis and design can be published quickly, informally and at a high quality level. Thus, lectures in a new field, material requiring timely publication, research reports, software developments and proceedings of meetings of exceptional interest (or devoted to a topic of wide interest) can be published within six months of receipt of manuscript in a series entitled 'Lecture Notes in Engineering'.

The subject work by Manzoor is at a level where the mathematics, if not of overpowering difficulty, is excruciatingly detailed. The development is based on what he claims is a more sophisticated model; one that treats a finned assembly consisting of both finned and prime surfaces as a combined entity. In addition, he provides a systematic attack on some of the limiting assumptions that prevail in the analysis of extended surface; two-dimensional effects, the analysis of radiation from extended surface and the applicability of the perfect contact assumption.

Most certainly, however, these lecture notes are on a graduate level and the use of the boundary integral equation analysis is proposed. It is felt that this rather new procedure, which provides an alternative to finite difference and finite element analysis, must be presented in conjunction with some rather concise examples so that the reader (user) can get into the swing of the method without the worry of whether he is proceeding correctly. The author does provide an example here and there, but there is fault to be found with both the number and scope of the examples.

The author deserves a great deal of credit in his attempt to bury the fin efficiency as a design tool (chapter 2). In this attempt, he comes up with an augmentation factor and then an enhancement factor which strongly resembles the fin effectiveness (usually attributed to Gardner). But the claim that 'the fin efficiency gives no indication whatsoever regarding the effect of the fins on the overall heat transfer' is felt to be somewhat ill-conceived. To be sure, there are better methods of looking at the effect of the fins (for example, by an electrothermal and by a transmission line analogy which Manzoor advocates and discusses), but as a design tool the fin efficiency may be better for the engineer designing the equipment than the somewhat formidable boundary integral equation approach.

In conclusion, the attack on the limiting assumptions in this work is commendable but we must never, as design people, lose sight of the fact that 'with all the assumptions, if it works twice as well in an analysis, then it might work twice as well in service'. The analyses in this book are works of art but much guidance is needed on how they may be applied to the proper fabrication of hardware.

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Published, price DM48, by Springer-Verlag, Heidelberger Platz 3, Postfach, D-1000 Berlin 33, FRG