

REVIEW

Nonlinear Conical Flow. By B. M. BULAKH, translated from the original Russian by J. W. Reyn and W. J. Bannink. Delft University Press, 1985. 326 pp. Dfl. 60.00.

The core of this book is a comprehensive and detailed account of the analysis of steady inviscid supersonic flows of a perfect gas past conical bodies. Much of this analysis originated with Professor Bulakh himself, and many significant contributions have come from other workers in the Soviet Union. Otherwise only available in the journal literature, this material was collected and presented systematically in the original Russian text published in 1970. It has now been carefully translated into English by Professor Reyn and Dr Bannink, from the Netherlands, who are themselves experts in conical flow, and to whom we must be grateful for their efforts.

Neighbouring topics are also treated, such as real flows about conical bodies, inviscid conical flows arising in other ways, numerical methods for conical flows, and models of separated flow. Work originating in the West is also treated thoroughly. Inevitably some of this now looks a little dated, but the core material retains its interest and value. Now that more complete numerical computations are possible, it is to be hoped that the fruitful interactions between analysis and computation which increased our understanding of some simple conical flows in the 1960's will be re-invigorated: that calculation methods will take account of structures revealed by analysis and that analysis will resolve the uncertainties of computation.

The text is reproduced from a pleasantly laid-out typescript, with the many equations re-typed and well displayed. For the most part, the figures have not been redrawn, and so retain that cramped and occasionally smudgy appearance familiar to students of the Russian literature. There are frequent typing errors, as might be expected when working in a foreign language, but nearly all are instantly correctable. For the resolution of two that are not, I am indebted to Professor Reyn: the words missing between pages 107 and 108 are 'that the terms containing S in equation (1.19) are smaller'; while on page 223 the expression '25-25°' should read '25-26°'. The English is good, apart from a generous sprinkling of redundant commas, and the reading is as easy as the subject allows. It is perhaps worth mentioning that the 'condition of no slip' refers to motion with lateral symmetry rather than to motion of the fluid on a boundary. The essential subject matter can readily be located from the elaborately structured table of contents, but, in the absence of an index, the casual enquirer will not discover the discussion of real gas effects in the section headed 'Hodograph method'.

Conical flow is a fascinating branch of fluid mechanics, with its three components of velocity and three of vorticity dependent on only two independent variables. It provides the fledgling aerodynamicist with a perch where he may rest after fluttering up from the flatland of planar flows before launching himself into the real world. It is also a subject of considerable practical importance, standing in relation to supersonic aerodynamics as the study of aerofoil section stands in relation to subsonic aerodynamics. As a devotee, Professor Bulakh clearly felt no need to stress the fascination, the importance, or the educative value; fellow-devotees may well feel the same; but the student is likely to need some tutorial guidance if he is to profit from this valuable monograph as he should. As a work of reference, it can be recommended wholeheartedly.

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