Fundamentals of Transonic Flow, by Trevor H. Moulden, John Wiley and Sons, New York, 1984, 332 pp., $46.95.

When I first saw a listing containing the title of this book I was filled with eager anticipation. A new book on transonic flow, one which would surely give an appropriate perspective to the enormous research advances of the past 15 years, must be forthcoming. Indeed, having recently taught a graduate level course on transonic flow, I was acquainted with the difficulties in conveying to the students the wonderful relationship between the analytical, experimental, and numerical solutions that have enriched our understanding of this complex and interesting flow regime. The disparity between the detailed texts of Ferrari and Tricomi[1] and Guderly[2] and the myriad of recent journal articles on numerical methods and experimental results will certainly be addressed.

Unfortunately, this new book by T. H. Moulden does not satisfy these expectations. The entire field of numerical contributions in transonic flow is virtually ignored. It is difficult to conceive that a current book on transonic flow does not even *mention* the truly pioneering works of Murman and Cole,[3] Jameson,[4] or Garabedian and Korn.[5] Furthermore, there is only brief reference to some of the immensely important engineering achievements such as the "Area Rule" and "Supercritical Airfoils" by R. T. Whitcomb[6,7] and others.

The author develops much of the subject matter using a considerable amount of mathematical jargon and set theoretic notation. This notation can be quite disconcerting to engineering students, and does not seem to add any particular degree of mathematical exactness or conciseness to his exposition. For example, he defines subsonic and supersonic domains as:

"Let $M(\{x_i\},t)$ be the local Mach number at the point $\{x_i\}$, then

$$\{x_i\}_{\text{sub}} \in \mathfrak{D}^n_{\text{sub}} \quad \text{if} \quad M(\{x_i\}_{\text{sub}},t) < 1$$

$$\{x_i\}_{\text{sup}} \in \mathfrak{D}^n_{\text{sup}} \quad \text{if} \quad M(\{x_i\}_{\text{sup}},t) > 1"$$

Clearly mathematical jargon has an extremely important role and many mathematical theories and proofs would not be accessible without it. However, since the intended purpose of this book is "... as an introductory text on transonic aerodynamics for engineers...," this format only serves to confuse the reader. The use of axioms, theorems, lemmas, remarks and the very formal *scholia* only seems to break up the continuity of his discursions on the subject matter.

The book is arranged in two parts. The first attempts to introduce the subject and review basic gasdynamics. The field equations are developed from axiomatic foundations using a sophisticated mathematical approach usually associated with rational mechanics. Along with standard topics in gasdynamics are discussions of limit processes, singular-limit surfaces, hodograph equations, and results and variational principles.

The second half of the book treats specific transonic flow features including phenomenology, small disturbance equations, and viscous flows. Embedded in these sections are some very clear qualitative discussions of important transonic physical phenomena. Issues of transonic drag rise along with shock-wave formation, shock-wave/boundary-layer interaction, and flow separation are quite informative. Unfortunately the relationship between the theory presented and the physical interpretations is not clearly developed.

This reviewer feels that this book cannot be recommended as a basic text on transonic flow for engineering students. As a treatise on the mathematical nature of transonic flow it will perhaps find a wider audience.

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[1]Ferrari, C. and Tricomi, F. G., *Transonic Aerodynamics*, Academic Press, New York, 1968.

[2]Guderly, K. G., *The Theory of Transonic Flow*, Pergamon Press Ltd., Oxford, 1962.

[3]Murman, E. M. and Cole, J. D., "Calculation of Plane Steady Transonic Flows," *AIAA Journal*, Vol. 9, 1971, pp. 114-121.

[4]Jameson, A., "Iterative Solution of Transonic Flows Over Airfoils and Wings, Including Flows at Mach 1," *Communications on Pure and Applied Mathematics*, Vol. 27, 1974, pp. 283-309.

[5]Bauer, F., Garabedian, P., and Korn, D., *Supercritical Wing Sections, Lecture Notes in Economics and Mathematical Systems*, Vol. 66, Springer-Verlag, New York, 1972.

[6]Whitcomb, R. T., "A Study of the Zero-Lift Drag Rise Characteristics of Wing-Body Combinations Near the Speed of Sound," NACA Technical Rept., R1273, 1956.

[7]Whitcomb, R. T., "Review of NASA Supercritical Aifoils," *Proceedings of the Ninth ICAS*, Vol. 1, 1984, pp. 8-18.