

# Book Review

---

## ***Introduction to Vortex Theory***

Hans J. Lugt, Vortex Flow Press, Potomac, MD, 1996, 627 pp., \$65.00

Evolving from a course of the same title developed a number of years ago, this book is intended as a text for graduate students of fluid dynamics. As any modern worker in fluid dynamics knows, vorticity has become the ubiquitous unifying element cutting across much of fluid dynamics, inviscid and viscous, laminar and turbulent. Theoretical analysis and computational fluid dynamics (CFD), particularly in recent years, have often made vorticity a principal dependent variable, whereas the imaging of results of CFD computations powerfully gains from visualizations of vorticity, such as vortex sheets, patches, filaments, rings, etc., or quantities derived from vorticity, such as helicity. Not surprisingly, then, more and more books are appearing devoted to vortices and vorticity. Lugt's book is among the most recent. After the presentation of some basic material about fluid mechanics in general, it goes on to separate chapters on vortices and vorticity in special cases, including potential flow, inviscid flow, viscous flow, and turbulent flow; near boundaries or bodies, including the case of vortex shedding; and with complicating physical effects such as that of a rotating frame, stratification, and buoyancy. Most of the chapters are short, the earlier introductory ones because

some background in fluid dynamics and mathematics is assumed, the latter ones because the author appears to be anxious to get on with the task of presenting vorticity in all of its many manifestations in fluid dynamics. As a result what we often get is not a systematic presentation of the material but a series of snapshots, a collection of results. On the other hand, there are extensive references to the literature, including the most recent, and a comprehensive and up-to-date feel to the book, albeit that some of its contents are cursorily sketched. The book has a very different character from the monograph by Saffman (*Vortex Dynamics*, Cambridge Univ. Press, 1992), which treats vorticity in inviscid flows but from a much more sophisticated point of view. Notwithstanding some of these caveats, Lugt is to be congratulated for having pulled together so much material on so important an area of fluid mechanics and for having provided this much more mathematical supplement to his wholly admirable, beautifully illustrated and written *Vortex Flow in Nature and Technology* (Wiley-Interscience, 1983).

Stanley A. Berger  
University of California, Berkeley