J. Fluid Mech. (1999), *vol.* 385, *pp.* 380–381. Printed in the United Kingdom

BOOK REVIEW

Fluid Mechanics: An Interactive Text. By J. A. LIGETT & D. A. CAUGHEY. American Society of Civil Engineers, 1998. CD-ROM for Macintosh or Windows. ISBN 0 7844 0310 4. $100 ($75 students).

CD-ROM versions of college textbooks are a new development in textbook publishing whose future remains unpredictable. While access to personal computers is becoming common among college students, especially in engineering and science, and internet literacy is almost universal, the replacement of hard copy texts by digital screen versions faces several obstacles. Publication costs are at least ten times those for hard copy texts (although 'print' costs are only a fraction as great) so that much larger than usual sales are required by commercial publishers to justify a CD-ROM text. Students seem reluctant to rely on the new format, especially when the traditional lecture and examination formats seem to make it more risky for them to do so. Nevertheless, the potential for better presentation of materials, especially graphic, video and computational software components not available in hard copy texts, makes the use of CD-ROM texts a very attractive proposition for university lecturers and their students.

The text under review consists of a typical undergraduate engineering fluid mechanics text, of more than average coverage, displayed on a 640×480 pixel screen, with access to enlarged (readable) figures, tables, worked examples, data displays and computational tools. Divided into loadable chapters, with a table of contents and index, the text is paginated (each screen page is the equivalent of a half page of a normal book) and is accessed from a contents page or several search routines. The format is hypertext with links to other pages, figures, tables, equations, videos, animations, etc. Problems and a bibliography for each chapter are included. Some fluid property data are available in active graphs and numeric output. Computational programs utilizing graphical user interfaces permit the working of many examples of fluid flow, such as viscous pipe and open channel flows, potential flow, compressible flow, and turbomachine flows. Audio commentary is minimal.

The added value of a CD-ROM text lies in its graphics, videos, animations and computational aids, and these are well done in this case. The use of colour greatly enhances the comprehensibility of figures (an advantage over hard copy texts). The animations devised here are generally excellent, especially those of Couette flow; unsteady potential flow illustrating the distinctions among streamlines, pathlines, and streak lines; Poiseuille pipe flow; Reynolds' experiment; secondary flow in a pipe bend; Falkner–Scan boundary layers; viscous wake of a cylinder; etc. (A few animations of mathematical derivations, e.g. the boundary layer equations, are of marginal value.) On the other hand, there are fewer video displays than animations and these are disappointingly less instructive. The computational aids are mainly those for viscous flow in channels, pipes and pipe networks and potential flows, and should be very useful to the student once the software has been mastered, which is easily done. These computational aids would introduce the student to the types of computational software used by professional engineers.

The text material is divided into two parts. The first seven chapters develop the conservation principles and main physical characteristics of fluid flow, while the second eight consider major applications in civil, mechanical and aeronautical engineering:

pipe flow, potential flow (irrotational and porous media flows), boundary layers, external flow, compressible flow, open channel flow, turbomachines, and mass transport. These latter are exceptionally detailed and extremely useful as introductions to these subjects. On the other hand, the first part is not of equal quality. The thermodynamics development, needed for compressible flow, is not clear: egregious mistakes (e.g. misdefining critical state properties as those of the triple point) misinform the student, although not fatally. The definition of incompressible flow is not complete: it fails to exclude sound waves. To their credit, the authors distinguish among the integral expressions for the first law of thermodynamics, the conservation of mechanical energy, and Bernoulli's equation, but fail to express these distinctions in recognizable physical terms. While these are subtle points that beginning students may not easily grasp, they are worth the effort to explain correctly in a textbook of this quality.

This CD-ROM text is nicely constructed and is a worthwhile addition to the textbook market.

J. A. Fay