study and modelling of turbulent flows". It is true that some of the fundamental aspects of turbulence research has not been very helpful in coming to grips with practical problems. Yet, as one reads the second part of the book, one wonderswhether a rational understanding of the small scales may not help for modelling purposes after all. Time and again, arbitrary approximations have to be made, whose ultimate validity depends precisely on the behavior of the small scales. As an example, the small-scale properties of the flow are at the origin of the failure of the gradient-diffusion hypothesis, demonstrated by the Tavoularis and Corrsin experiments, and briefly discussed p. 362. Remarkably, scalar mixing is relatively little discussed. It may be worth mentioning that this particular problem has recently been the subject of important theoretical progress (see, e.g., the two review articles of Warhaft, Annu. Rev. Fluid Mech. 32 (2000) 203 and of Shraiman and Siggia, Nature 405 (2000) 639), which show that some of the essential assumptions used in modelling, such as the postulate of local isotropy, should be regarded as highly suspect. These aspects are indeed significant for modelling of mixing by LES, as demonstrated recently (e.g., by Kang and Meneveau, J. Fluid Mech. 442 (2001) 161). The prediction of turbulence structure near a wall, or more generally, in the presence of rapid temporal and spatial variations (see, e.g., J.C.R. Hunt et al., J. Fluid Mech. 436 (2001) 359) is another example where the success of LES (and modelling) has been somewhat limited. Clearly, small scale motion *is* important in these cases, and its understanding is likely to be part of the solution.

In spite of these limitations, Stephen Pope's book is definitely an important text on the subject of turbulence. The book will be very useful for students, engineers and scientists alike. The caveat is that turbulence has many facets, and some of the aspects dismissed as too academic (of too narrow a range of applicability) may turn out to be important, even for modelling purposes. As such, it would be unwise to learn the subject of turbulence from Pope's textbook alone. Complementary reading from other textbooks, such as Tennekes and Lumley (First Course in Turbulence, MIT Press, 1971), or Frisch (Turbulence: the Legacy of A.N. Kolmogorov, Cambridge University Press, 1995) or others, will provide much additional insight on the subject. On the other hand, Pope's textbook clearly fills a gap towards applications.

As such, Stephen Pope's book is well worth reading and studying.

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Dynamics of Droplets

by A. Frohn and N. Roth (Springer-Verlag, Berlin, 2000, 286 pp., 193 figures) DM 149.00, öS 1 088.00, sFr 136.00, £51.50, US$ 82.00 hardcover ISBN 3 540 65887 4

The book 'Dynamics of Droplets' by Arnold Frohn and Norbert Roth, affiliated with the 'Institut für Thermodynamik der luft- und Raumfahrt' (ITLR) of the University of Stuttgart, Germany, covers much more than the title suggests. Of course, the dynamics of droplets is the major theme, but the book also describes the basic physical properties of droplets, thermodynamics, surface tension, phase equilibrium, evaporation and combustion, and the interaction of droplets with light. The latter is important for understanding optical diagnostic methods with which droplet sizes, velocities and temperatures can be determined. The book describes how droplets are formed, how they interact, how they can be captured by subjecting them to forces of different nature, electrical, magnetic, optical, acoustical. The chapter on experimental and measurement techniques gives a nice concise overview with attention to recent developments such as rainbow techniques for measuring individual droplet size and refractive index. The book contains beautiful pictures of droplets colliding with (heated) walls and of mutually colliding droplets. This is really the heart of the book, reporting on work done at ITLR. It is fascinating to see how droplets strongly deform during collision, how they separate or bounce, depending on the position in parameter space. Attention is also given to very successful numerical modeling of these complicated phenomena. A variety of other topics is treated with emphasis on the experimental approach: evaporation, combustion and micro-explosions in individual droplets, flame propagation in sprays, disintegration of droplets due to shock wave passage, wetting phenomena. The book is a very valuable overview of our current knowledge on the dynamics

of droplets, important because of the many novel technical applications of droplets such as in ink-jet printing, thermal spraying, microencapsulation, aerosol technology, just to mention a few. Where the book is rather concise in its treatment, the reader is referred to the literature. With 537 relevant references the book cannot be overlooked by those with even a vague interest in droplet dynamics.

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