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REVIEW

New Perspectives in Thermodynamics. Edited by J. SERRIN. Springer, 1986. 260 pp. DM 89.

The subject of thermodynamics impresses by its great generality and by its wide applicability. It should form a central part of science and of scientific education. But anyone who has had the job of teaching it finds widely varying attitudes to it (among chemists, engineers, mathematicians, and so on), so that it appears to be more like a different subject in these contexts. He or she may also meet a bizarre mixture of abstraction alongside arguments that have to do with something like the design of steam engines. The illustrations are usually restricted to simple substances, and one is told about the three states of matter, with solids becoming liquids at higher temperature, whereas in real life this can be just plain wrong, as is obvious to anyone who has cooked an egg.

There is a clear intellectual challenge: to present the subject in a unified, general, and modern way, starting from carefully stated foundations (I hesitate to say axioms), and in a way that is capable of encompassing materials having unusual or complicated behaviour. It should also include some version of the 'Second Law', with its implications of macroscopic irreversibility.

Most of us wisely decline this challenge, preferring to work in a more specific area. Some would avoid it by arguing that thermodynamics is not really an autonomous subject, in the sense that its results should be derivable more fundamentally from statistical mechanics. However, given the chaotic state of the foundations of that subject, that argument is questionable. The challenge has been squarely faced for some three decades by a group or 'school' generally associated with Clifford Truesdell, many of whom are authors of chapters in the edited volume here reviewed. To the outsider, the school seems rather introvert, with its own house journal and technical terms that have not taken root outside. Where does one start with such a voluminous and difficult literature? Better not to try, unless one is actually apprenticed to the school! So the appearance of a book such as this offers help and invites us to look at it again. According to the Preface, 'the thirteen papers in this volume gather together for the first time the many ideas and concepts which have raised classical thermodynamics from a heuristic and intuitive science to the level of precision demanded of other branches of mathematical physics'. For some readers the book may well succeed. But be warned – it is still daunting. You will not find how to deal with the entropy of non-drip paint or other mundane things. Opening the book at random, you might be excused for thinking you had inadvertently opened a volume of Bourbaki. The members of the school seem to find it difficult not to write for each other.

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