Cercignani, Carlo
The Boltzmann equation and its applications. (English) [Zbl 0646.76001]
Applied Mathematical Sciences, Vol. 67. New York etc.: Springer-Verlag. XII, 455 p.; DM 98.00 (1988).

This book may be considered as a textbook for an advanced course in kinetic theory. The main line of exposition is tied to the classical equation established by Ludwig Boltzman in 1872, and hence the detailed descriptions of some applications almost exclusively refer to monoatomic neutral gases. The material dealing with the basic properties and applications known before 1975 was covered in a previous book of the author [Theory and application of the Boltzmann equation (1975; Zbl 0403.76065)]. The first seven chapters of that book are incorporated into the present one.

Contents: I. Basic principles of the kinetic theory of gases, II. The Boltzmann equation, III. Gas-surface interaction and the H-theorem, IV. Linear transport, V. Small and large mean free paths, VI. Analytical solutions of models, VII. The transition regime, VIII. Theorems on the solutions of the Boltzmann equation, Appendix.

Compared with the previous book, Chapter VIII is completely rewritten and covers the important studies resulting from new mathematical approaches (for example: nonstandard analysis approach) to the old problem of existence and uniqueness, as well as to the new problems connected with the question of validity of the Boltzmann equation. The aim of the Appendix is to complete the material of the first seven chapters of the book with the developments from 1975 to 1987.

Reviewer: Y.R.Romanovsky

MSC:

76-02	Research exposition (monographs, survey articles) pertaining to fluid mechanics
82B05	Classical equilibrium statistical mechanics (general)

Cited in **3** Reviews
Cited in **718** Documents

Keywords:

kinetic theory; classical equation; monoatomic neutral gases; Boltzmann equation; Gas-surface interaction; H-theorem; Linear transport; Analytical solutions; transition regime; nonstandard analysis approach; problem of existence; uniqueness