1. Record Nr. UNINA9910782116003321

Autore	Chen Tian-Quan
Titolo	A non-equilibrium statistical mechanics [[electronic resource]] : without the assumption of molecular chaos / / Tian-Quan Chen
Pubbl/distr/stampa	River Edge, N.J., : World Scientific, c2003
ISBN	1-281-93562-X 9786611935627 981-279-519-7
Descrizione fisica	1 online resource (xvi, 420 p.)
Disciplina	530.13
Soggetti	Statistical mechanics Sturm-Liouville equation
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Bibliographic Level Mode of Issuance: Monograph
Nota di bibliografia	Includes bibliographical references (p. 407-414) and index.
Nota di contenuto	1. Introduction. 1.1. Historical background. 1.2. Outline of the book -- 2. H-functional. 2.1. Hydrodynamic random fields. 2.2. H-Functional -- 3. H-functional equation. 3.1. Derivation of H-functional equation. 3.2. H-functional equation. 3.3. Balance equations. 3.4. Reformulation -- 4. K-Functional. 4.1. Definition of K-functional -- 5. Some useful formulas. 5.1. Some useful formulas. 5.2. A remark on H-functional equation -- 6. Turbulent Gibbs distributions. 6.1. Asymptotic analysis for Liouville equation. 6.2. Turbulent Gibbs distributions. 6.3. Gibbs mean -- 7. Euler K-functional equation. 7.1. Expressions of B[symbol] and B[symbol]. 7.2. Euler K-functional equation. 7.3. Reformulation. 7.4. Special cases. 7.5. Case of deterministic flows -- 8. Functionals and distributions. 8.1. K-functionals and turbulent Gibbs distributions. 8.2. Turbulent Gibbs measures. 8.3. Asymptotic analysis -- 9. Local stationary Liouville equation. 9.1. Gross determinism. 9.2. Temporal part of material derivative of T[symbol]. 9.3 Spatial part of material derivative of T[symbol]. 9.4. Stationary local Liouville equation -- 10. Second order approximate solutions. 10.1. Case of Reynolds-Gibbs distributions. 10.2. A poly-spherical coordinate system. 10.3. A solution to the equation (10.24)[symbol]. 10.4. A solution to the equation (10.24)[symbol]. 10.5. A solution to the equation (10.24) [symbol]. 10.6. A solution to the equation (10.24)[symbol]. 10.7. A

solution to the equation (10.24)[symbol]. 10.8. A solution to the equation (10.24)[symbol]. 10.9. Equipartition of energy -- 11. A finer K-functional equation. 11.1. The expression of B[symbol]. 11.2. The contribution of G[symbol] to B[symbol]. 11.3. The contribution of G [symbol] to B[symbol]. 11.4. The contribution of G[symbol] to B [symbol]. 11.5. The expression of B[symbol]. 11.6. The contribution of G[symbol] to B[symbol]. 11.7. The contribution of G[symbol] to B [symbol]. 11.8. The contribution of G[symbol] to B[symbol]. 11.9. The contribution of G[symbol] to B[symbol]. 11.10. The contribution of G [symbol] to B[symbol]. 11.11. The contribution of G[symbol] to B [symbol]. 11.12. A finer K-functional equation -- 12. Conclusions. 12.1. A view on turbulence. 12.2. Features of the finer K-functional equation. 12.3. Justification of the finer K-functional equation. 12.4. Open problems.

Sommario/riassunto

This book presents the construction of an asymptotic technique for solving the Liouville equation, which is to some degree an analogue of the Enskog-Chapman technique for solving the Boltzmann equation. Because the assumption of molecular chaos has been given up at the outset, the macroscopic variables at a point, defined as arithmetic means of the corresponding microscopic variables inside a small neighborhood of the point, are random in general. They are the best candidates for the macroscopic variables for turbulent flows. The outcome of the asymptotic technique for the Liouville equation reveals some new terms showing the intricate interactions between the velocities and the internal energies of the turbulent fluid flows, which have been lost in the classical theory of BBGKY hierarchy.