Lutz, Robert
La force modélisatrice des théories infinitésimales faibles. (French) [Zbl 0810.03052]

The Internal Set Theory approach [E. Nelson, Bull. Am. Math. Soc. 83, 1165-1198 (1977; Zbl 0373.02040)] to nonstandard analysis [A. Robinson, Non-standard analysis (1966; Zbl 0151.008)] constitutes the background of the so called “weak infinitesimal theories” which are summarized in the first part of the paper. The second part contains subtle discussions of some very general aspects regarding the Boltzmann equation, $H$-theorem, equilibrium states, and trend to equilibrium by using the language and means of the weak infinitesimal theory with one or two levels. It is the author’s declared purpose to motivate the introduction of weak infinitesimal theories in the physicist’s practice for reconciliation of heuristic intuition with requirements of mathematical rigor.

For the entire collection see [Zbl 0758.00020].

Reviewer: Gh.Gr.Ciobanu (Iaşi)

MSC:

03H10 Other applications of nonstandard models (economics, physics, etc.)
82B40 Kinetic theory of gases in equilibrium statistical mechanics
82C40 Kinetic theory of gases in time-dependent statistical mechanics
76P05 Rarefied gas flows, Boltzmann equation in fluid mechanics

Keywords:

internal set theory; nonstandard analysis; Boltzmann equation; $H$- theorem; equilibrium states; trend to equilibrium; weak infinitesimal theories