Orlov, V. N.; **Rozonoer, L. I.**

The macrodynamics of open systems and the variational principle of the local potential. I.

(English) Zbl 0554.93004
J. Franklin Inst. 318, 283-314 (1984).

The first part of this paper, which consists of two parts, presents a general phenomenological approach for a macroscopic description of the dynamics of open systems far from the equilibrium state. A class of ordinary differential macrodynamic equations is introduced and theorems of existence, uniqueness and stability of stationary states are proved. Singularly perturbed macrodynamic equations are considered. The procedure of simplification for these equations is defined and a theorem on proximity of solutions of the initial and the simplified systems is proved. The variational principle of the local potential for macrodynamic equations is formulated and studied. Iterative procedures for computing stationary states based on this principle are constructed. The second part of the paper is devoted to applications.

Reviewer: M.Rijckaert

MSC:

93A10	General systems
49S05	Variational principles of physics (should also be assigned at least one other classification number in Section 49-XX)
80A30	Chemical kinetics in thermodynamics and heat transfer
34D15	Singular perturbations of ordinary differential equations
37-XX	Dynamical systems and ergodic theory
92Cxx	Physiological, cellular and medical topics
82B35	Irreversible thermodynamics, including Onsager-Machlup theory

Keywords:

open systems; macrodynamic equations; stationary states; simplification; variational principle of the local potential

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