

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

The macrodynamics of open systems and the variational principle of the local potential. II: Applications. (English) [Zbl 0554.93005](#)

J. Franklin Inst. 318, 315-347 (1984).

[For part I see the paper reviewed above]. The second part of the paper presents the application of macrodynamic methods for the deduction and investigation of chemical kinetic equations (the theoretical aspects are treated in a previous part). In particular, nonisothermal chemical equations are considered, balanced systems are studied and the method of quasistationary concentration is discussed. For open isothermal systems a theorem on existence of a positive stationary state is proved.

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

Cited in 1 Review
Cited in 2 Documents

Keywords:

[balanced systems](#); [open isothermal systems](#); [stationary state](#)

Full Text: [DOI](#)

References:

- [1] Landau, L.D.; Lifshitz, E.M., Statistical physics, (1960), Pergamon Press New York · [Zbl 0080.19702](#)
- [2] Münster, A., Chemische thermodynamik, (1969), Akademie Berlin
- [3] Vasiliev, V.M.; Volpert, A.I.; Hudjaev, S.I., On the method of quasistationary concentrations for chemical kinetic equations, J. computation. math. mathematical phys., 687-697, (1973), (in Russian).
- [4] Volpert, A.I.; Hudjaev, S.I., Analysis in classes of ruptured functions and the equations of mathematical physics, (1975), Nauka Moscow, (in Russian).
- [5] Akramov, G.A.; Bykov, V.I.; Yablonskii, G.S., On the investigation of dynamical properties of nonideal chemical systems, (), 206-210, (in Russian).
- [6] Horn, F.; Jackson, R., General mass action kinetics, Archive for rational mechanic and analysis, Vol. 47, No. 2, 81-116, (1972)
- [7] Feinberg, M., Complex balancing in general kinetic systems, Archive for rational mechanic and analysis, Vol. 49, No. 3, 187-194, (1972)
- [8] Horn, F., Necessary and sufficient conditions for complex balancing in chemical kinetics, Archive for rational mechanic and analysis, Vol. 49, No. 3, 178-186, (1972)
- [9] Harary, F., Graph theory, (1969), Addison-Wesley London · [Zbl 0797.05064](#)
- [10] Feinberg, M.; Horn, F., Dynamics of open chemical systems and algebraic structure of the underlying reaction network, Chem. engng sci., Vol. 29, No. 3, 775-787, (1974)
- [11] Orlov, V.N., Conditions for instability in systems of interacting subsystems and their application to chemical kinetics problems, Auto. remote control, 21-29, (1980), No. 10 · [Zbl 0465.93007](#)
- [12] Orlov, V.N.; Rozonoer, L.I., Variational principle for macrodynamic equations and its application to chemical kinetics, J. computation. math. mathematical phys., 1192-1205, (1981), (in Russian).
- [13] Kantorovich, L.V.; Akilov, G.P., Functional analysis, (1977), Nauka Moscow, (in Russian). · [Zbl 0555.46001](#)
- [14] Rockafellar, R.T., Convex analysis, (1970), Princeton University Press Princeton · [Zbl 0202.14303](#)

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically

matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.