

Germain, P.; Nguyen, Q. S.; Suquet, P.
Continuum thermodynamics. (English) Zbl 0536.73004
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The authors have tried to exhibit some of the most significant lines of research, appeared in literature during the last 15-20 years in continuum thermodynamics. The main parts of this paper are briefly described:

The first section is devoted to the basic equations. Section II is concerned with the concepts connected with the generalization of the second law. It will provide the opportunity to mention a few important questions and answers formulated in the spirit of rational thermodynamics. Section III describes the method of the "local accompanying equilibrium state" (l.a.s.) which will be used later in its most convenient version, i.e., when the constitutive equations may be obtained from two scalar valued convex functions: a thermodynamical potential and a pseudopotential of the dissipations.

Some classical applications, mainly in solid mechanics, are given in section IV. The concept of global state variables is introduced in section V, and its interest is illustrated in relevant examples. Section VI, which is devoted to homogeneization and thermodynamics, provides some insight into the consistency of the l.a.s. model and into its physical interpretation by exhibiting the relations between descriptions at the microlevel and at the macrolevel. Finally, a few elements of bifurcation and stability theory are given in section VII. They show that the model emphasized in this paper provides a first significant contribution toward what was called the third main objective.

MSC:

[74A15](#) Thermodynamics in solid mechanics
[74A20](#) Theory of constitutive functions in solid mechanics

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Keywords:

basic equations; generalization of the second law; local accompanying equilibrium state; classical applications; concept of global state variables; homogeneization; relations between descriptions at the microlevel and at the macrolevel; bifurcation; stability

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