of **Universal evolution criterion.** Indeed, even for processes involving convection effects, this criterion preserves its bilinear form. This is easily obtained by adding the equality:

(7.17) \[ \int \left[ \varrho h \nabla T + \sum_{\gamma} \varrho_{\gamma} \nabla (\mu_{\gamma} T^{-1}) \right] dV = 0 \]

derived from the Gibbs-Duhem relation, \( \nabla = \) barycentric velocity) to the entropy production given by (7.1). We obtain in this way the associated bilinear expressions:

(7.18) \[ P = \int \sum_{\alpha} J_{\alpha} X_{\alpha} dV > 0 \]

for the entropy production, and

(7.19) \[ \int_{\tau} \sum_{\alpha} J_{\alpha} d_{\tau} X_{\alpha} dV \leq 0 \quad (d_{\tau} \equiv \partial / \partial \tau) \]

for the corresponding evolution criterion under stationary boundary conditions.

Let us recall that the flows \( J_{\alpha} \) here considered, involve a conduction flow as well as a convection flow (for more details and some restrictions, see [1]).

8. The Local Potential.

As a rule, to approach the evolution problem by attempting to solve the differential equations as they arise from the conservation and phenomenological laws, together with
the constraints prescribed to the system (initial and boundary conditions) is a question attended by great difficulties.

In many cases, only approximate methods of numerical analysis are available. In this respect, the variational techniques present a particular interest whenever the solution of the problem may be derived as the minimum of some potential associated to the basic equations.

Unfortunately, in the general case, the evolution criterion \( d_x P < 0 \), occurs in the form of a non exact differential whereas its reduction to an exact differential of a potential is only possible for particular situations. As an example, most of the non-linear problems are devoid of such an associated potential, and therefore cannot be solved by the classical variational techniques as the Rayleigh-Ritz method.

Nevertheless, as pointed out hereafter, it remains still possible to split the differential expression of the evolution criterion into two parts in such a way, that one of these corresponds to the exact differential of a potential \( \Phi \) (say).

Then, this potential occurs as a functional characterized by the following properties:

(i) - The Euler-Lagrange equations derived from \( \Phi \), together with additional subsidiary conditions stated below, restore the basic differential equations.

(ii) - For fixed boundary conditions, all arbitrary increment \( \Delta \Phi \) starting from this stationary solution, is