C.-C. WANG

Corrections and Remarks on my Paper
“Generalized Simple Bodies”

Vol. 32, pp. 1–28 (1969)

The concept of a *phase* of a material point introduced in my paper was intended to represent an open set of state variables over which the response function can be regarded as the *restriction* of a fictitious response function that possesses a distinguished (global) isotropy group. Although I used the concept of a phase strictly in this sense throughout my paper, the definition I gave, however, did not correspond to my intention completely. This remark was communicated to me by Professor D. R. OWEN. He pointed out that the collection of all local material automorphisms, as defined by the condition (2.4) in my paper, generally need *not* form a group. Now if that collection happens to be a group, then the definition of a phase stated later in my paper corresponds accurately to my intended meaning. On the other hand, if that collection does not form a group, then my definition cannot be applied.

In the physical interpretation, the latter possibility corresponds to the situation that for sufficiently small deformations (*i.e.*, in a neighborhood of the identity map) the response of the material relative to a configuration $\kappa_0 \mathbf{A}\mathbf{B}$ is *different* from that relative to the configuration κ_0 , while the response relative to κ_0 is the same as that relative to $\kappa_0 \mathbf{A}$ and is also the same as that relative to $\kappa_0 \mathbf{B}$, for the same $\mathbf{A}$ and $\mathbf{B}$. I do not know whether or not this situation occurs physically. Mathematically, however, this possibility need not be ruled out.

Now suppose that the local material automorphisms at a state do not form a group. Then I would define a *local isotropy group* simply as a maximal group consisting of local material automorphisms. According to this definition, a local isotropy group is *not* unique. I call a state (κ_0, θ_0) a *g -phase point* if g is a local isotropy group at all states in a neighborhood of (κ_0, θ_0) . The collection of all *g -phase points*, for a particular local isotropy group g , is then called a *phase*.

This more general definition for the concept of a *phase* now reflects my intended meaning completely. First, it is clear that a phase is an open set of state variables. Second, a phase cannot be a subset of another phase. That is to say, all *g -phase points* cannot be entirely *$\bar{g}$ -phase points* if $\bar{g}$ is different from g . This fact is more or less obvious, since if it were not true, then the group generated by the union of g and $\bar{g}$ would be a group of local material automorphisms at the *g -phase points*, contradicting the condition that both g and $\bar{g}$ are maximal there. Thus every phase has a distinguished *phase isotropy group*.

The phases may intersect one another, however. The intersection of the phase of g -phase points with the phase of $\bar{g}$ -phase points consists of points having both g and $\bar{g}$ as their local isotropy groups. Over such an intersection, the response function may be regarded as the restriction either of a fictitious response function whose (global) isotropy group is $\bar{g}$, or of a fictitious response function whose (global) isotropy group is g . The response function over a particular phase, however, can be regarded only as the restriction of a fictitious response function whose (global) isotropy group is equal to the phase isotropy group (or its subgroups, of course).

Since the theory developed in my paper concerns generalized simple bodies in a *single phase* only, it is not affected by the more general definition of a phase given here. More types of phase transitions are possible, however, because of the more general definition.

Rice University
Houston

(Received May 7, 1969)