# *Comments on "Glass Transition Behaviour of Particle Composites Modelled on the Concept of Interphase" by P. S. Theocaris and G. D. Spathis*[1]

This paper investigates the behaviour of particle composites through the value of their glass transition temperature using the concept of boundary interphase introduced by Papanicolaou, Paipetis and Theocaris[2]. This aspect intends to account for the influence of several interfacial effects occuring in composites—from imperfect bonding to chemical interactions. The assumption of a third homogeneous and isotropic phase between matrix and filler having individual mechanical properties is supposed to provide a quantitative evaluation of this influence[3].

The article presents an analysis on the basis of three steps:

(a) a generalized expression for the rule of mixtures

$$E = E_f V_f K + E_m V_m + E_i V_i \tag{1}$$

where $E$ stands for Young's Modulus; $V$ for volume fraction, the indices; $f$,$m$, and $i$ for filler, matrix, and interphase; and $K$ is an adhesion coefficient.

(b) a value of the glass transition frequency $\omega_g$ which is given by

$$\left|\frac{\partial \eta(\omega)}{\partial \omega}\right|_{\omega=\omega_g} = 0 \tag{2}$$

if one deals with harmonic loading. $\eta$ is the loss factor of the material which assumes a peak value at $\omega = \omega_g$.

(c) analytical expressions for the dynamic moduli which correspond to Maxwell and Voigt models.

With the aid of simplifying assumptions the somewhat lengthy analysis arrives at the conclusion that the thermomechanical behaviour of the composite depends essentially on the properties of the interphase.

This does not appear to be a new and surprising result. In fact, the paper represents essentially an incomplete reproduction of an article by S. A. Paipetis[4] which reached the same conclusions. The method to determine quantitatively $\omega_g$ has been introduced earlier[5] and has also been applied to particle composites[4].

The present paper does not refer to either of these articles even though parts of its text are a verbatim repetition of the corresponding text of reference[4]; it does not contain any new independent results.

## References


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