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Nonlinear Affine Extension of the Three-Phase Sphere Model

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To model the nonlinear behaviour of particulate composites, the classical procedure of transforming, at a given strain, a nonlinear problem into a linear one has been used. The chosen linearisation method is the recently proposed affine formulation which has been coupled to the three phase self-consistent estimate of the linearised overall properties, in the case of uniaxial loading. Due to the anisotropic tangent behaviour, the linear three-phase self-consistent estimate is computed numerically. This treatment has been applied to two-phase composites with nonlinear elastic behaviours described by power-law stress-strain relationships, but the same developments are still valid for viscous materials.

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