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Eigenstrain boundary integral equation with local Eshelby matrix for ellipsoidal particles.
(Chinese. English summary) [Zbl 1340.65280]

Summary: Aiming at large scale numerical simulation of particle reinforced materials, a concept of local Eshelby matrix is introduced into a computational model of the eigenstrain boundary integral equation to solve the problem of interactions among particles. The local Eshelby matrix can be considered as an extension of Eshelby tensor and an equivalent inclusion in a numerical form. Taking the sub-domain boundary element method as the control, three-dimensional stress analyses are carried out for some ellipsoidal particles in infinite media with the proposed computational model. Numerical examples verify correctness, feasibility and high efficiency of the presented model with the corresponding solution procedure, showing potential of solving large scale numerical simulations for particle reinforced materials.

MSC:
65N38 Boundary element methods for boundary value problems involving PDEs
82C22 Interacting particle systems in time-dependent statistical mechanics
35Q82 PDEs in connection with statistical mechanics

Keywords:
eigenstrain; Eshelby tensor; equivalent inclusion; near field particle; local Eshelby matrix; interactions among particles; numerical results; boundary element method

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