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Generalization of the Eshelby Method for Solving Elasticity Problems with Phase Transformations and for Piecewise Homogeneous Bodies

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The elastic problems with phase transformations and for piecewise homogeneous bodies are considered. Generalization of Eshelby's method is developed. This generalization enables to consider both frontal and distributed phase transformations in inclusions of arbitrary shape. The stress state is investigated for the following problems: 1. Phase transformation of an inclusion accompanied by a change of the shape and the sizes of the inclusion; 2. A problem for an inhomogeneity of an arbitrary shape; 3. Phase transformation of an inclusion accompanied by a change of its shape, sizes and also elastic constants. A system of integral equations relatively the components of the stress tensor inside the inclusion is derived for the problems 2 and 3. When the inclusion is an elliptical cylinder the system of equations is solved analytically and explicit analytical expressions for the stress tensor both inside and outside the inclusion are obtained.

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