

THIN INCLUSIONS IN ELASTIC BODIES

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In the talk, we discuss models to describe a state of equilibrium for elastic bodies with thin inclusions. It is assumed that a delamination of the inclusions takes place thus forming a crack between the elastic body and the inclusion. Presence of inclusions and cracks in elastic bodies is a source of stress concentrations. Moreover, a rigidity of the inclusion is one of the parameters responsible for crack propagations. We consider the free boundary approach for modeling the phenomenon. In particular, nonlinear boundary conditions of inequality type are considered at the crack faces to prevent a mutual penetration. Correct mathematical formulations of the problem is proposed. We prove a solution existence for the suitable free boundary problems and analyze other properties of the solution for different locations of thin inclusions with respect to the external boundary. Moreover, we analyze limit cases describing the passages to infinity and zero of the rigidity parameter of the inclusion. In particular, the models of rigid inclusions, semi-rigid inclusions with delaminations and crack models with the non-penetration conditions (inclusions with a zero rigidity) are obtained in the limits.

References

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