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On 3-D Thermoelastic Problems of Interfacial Cracks in a Periodic Stratified Space

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This paper provides the methods of solutions to three-dimensional stationary thermoelastic problems involving a two-layered microperiodic space weakened by an interface crack of arbitrary smooth profile. An approximate analysis is performed within the framework of linear stationary thermoelasticity with microlocal parameters. By constructing the appropriate potential functions, the resulting boundary-value problems are reduced to the corresponding ordinary mechanical crack problems in homogeneous isothermal elasticity. The governing singular integral and integro-differential equations are also derived. The thermal stress field exhibits the classical inverse square root singularity without the normal interface oscillatory feature, which allows us to apply the classical concepts of fracture mechanics in terms of stress intensity factors.

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