

definition remark Example $\square\square$ erfc

Two-phase Stefan problem with nonlinear thermal coefficients and a convective boundary condition

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Abstract

We consider a non-linear two-phase unidimensional Stefan problem, which consists on a solidification process, for a semi-infinite material $x > 0$, with phase change temperature T_1 , an initial temperature $T_2 > T_1$ and a convective boundary condition imposed at the fixed face $x = 0$ characterized by a heat transfer coefficient $h > 0$. We assume that the volumetric heat capacity and the thermal conductivity are particular nonlinear functions of the temperature in both solid and liquid phases and they verify a Storm-type relation. A certain inequality on the coefficient h is established in order to get an instantaneous phase change process. We determine sufficient conditions on the parameters of the problem in order to prove the existence and uniqueness of a parametric explicit solution for the Stefan problem.

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