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STEFAN PROBLEMS WITH THE UNILATERAL BOUNDARY CONDITION ON THE FIXED BOUNDARY IV

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0. Introduction

We consider the behavior of the solution of the following one-dimensional two phase Stefan problem with the unilateral boundary condition on the fixed boundary: Given the initial data, l and $\phi(x)$, find a critical time T^*, and the two functions $s=s(t)$ and $u=u(x, t)$ defined on $[0, T^*]$ such that

$$(S)\begin{cases} (0.1) & s(0)=l,\ 0<s(t)<1\ (0\leqq t<T^*), \\ (0.2) & u_{xx}-c_0u_t=0\ (0<x<s(t),\ 0<t<T^*), \\ (0.3) & u_{xx}-c_1u_t=0\ (s(t)<x<1,\ 0<t<T^*), \\ (0.4) & \text{(a)}\ \ u_x(0, t)\in\gamma_0(u(0, t))\ (0<t<T^*), \\ & \text{(b)}\ \ -u_x(1, t)\in\gamma_1(u(1, t))\ (0<t<T^*), \\ (0.5) & \text{(a)}\ \ u(x, 0)=\phi(x)\ (0<x<l), \\ & \text{(b)}\ \ u(x, 0)=\phi(x)\ (l<x<1), \\ (0.6) & u(s(t), t)=0\ (0<t\leqq T^*), \\ (0.7) & b\dot{s}(t)=-u_x^-(s(t), t)+u_x^+(s(t), t)\ (0<t<T^*). \end{cases}$$