1011-35-15 **Marianne K. Korten** (marianne@math.ksu.edu), Department of Mathematics, Kansas State University, Manhattan, KS 66506, and **Charles N. Moore*** (cnmoore@math.ksu.edu), Department of Mathematics, Kansas State University, Manhattan, KS 66506. *On the two-phase Stefan problem.* Preliminary report.

We consider the two-phase Stefan problem $u_t = \Delta\alpha(u)$ on $\mathbb{R}^{n+1}_+$, where $\alpha(u) = u+1$ for $u < -1$, $\alpha(u) = 0$ for $-1 \leq u \leq 1$, and $\alpha(u) = u - 1$ for $u \geq 1$. This equation describes the flow of heat within a substance which can be in a liquid or a solid phase, and for which there is a latent heat to initiate phase change.

We discuss existence and uniqueness of solutions of the Cauchy problem, energy estimates and regularity of solutions. Part of the proof of regularity involves showing that $|\alpha(u)|$ is subcaloric; the loss with respect to a caloric function is accounted for by a Radon measure supported on the free boundary $\partial\{(x,t) : |\alpha(u)| > 0\}$. We discuss this measure and the geometry of the free boundary. (Received June 17, 2005)