1057-35-315 **Marianne K Korten** and **Charles N Moore*** (cnmoore@math.ksu.edu), Department of Mathematics, Kansas State University, Manhattan, KS 66506. *The two-phase Stefan problem.*

We consider the two-phase Stefan problem $u_t = \Delta\alpha(u)$ where $\alpha(u) = u + 1$ for $u < -1$, $\alpha(u) = 0$ for $-1 \leq u \leq 1$, and $\alpha(u) = u - 1$ for $u > 1$. This models the flow of heat within a substance which can be in a liquid phase or a solid phase, and for which there is a latent heat to initiate phase change. This allows for the presence of a mushy zone, that is, a region which is between the liquid and solid phases. We will discuss existence and regularity of solutions, as well as uniqueness. (Received January 25, 2010)