Meeting: 1000, Albuquerque, New Mexico, SS 12A, Special Session on Regularity in PDEs and Harmonic Analysis

1000-35-129 **Marianne K Korten*** (marianne@math.ksu.edu), Department of Mathematics, Kansas State University, 138 Cardwell Hall, Manhattan, KS 66506, and **Donatella Danielli**. *On the pointwise jump condition at the free boundary in the one phase Stefan problem with a "mushy" zone.*

We consider locally integrable, nonnegative solutions in the sense of distributions of the one-phase Stefan problem

$$u_t = \Delta(u-1)+ .$$

We recall that the measure $\lambda = -\mathrm{div}_{x,t}(\nabla(u-1)_+, -(u-1)_+) = (u-(u-1)_+)_t$ is supported on the free boundary $F = \partial\{(x,t) : (u-1)_+(x,t) > 0\}$, and carried by a countably rectifiable set.

Theorem Assume that in a subset E of F, the $n-$density of λ is bounded away from 0. Them for $\mathcal{H}^n$ a. e. $(x_0,t_0) \in E$

$$\lim_{r\to 0} \frac{\lambda(C_r)}{r^n} = (1-u_I)_+(x_0)\nu_t(x_0,t_0) = -L(x_0,t_0)$$

where $C_r(x_0,t_0)$ stands for the cylinder $B_r(x_0)\times(t_0-r,t_0+)$, (ν_x,ν_t) in the outer unit normal to $\{(u-1)_+ > 0\}$ at $(x_0,t_0) \in F_{\mathrm{red}}$, $L(x_0,t_0)$ the trace of $(\nabla(u-1),0)\cdot\nu(x_0,t_0)$ (attained in the sense of Gauss-Green's theorem), and u_I the (absolutely continuous part of the) initial data. (Received August 21, 2004)