Meeting: 1003, Atlanta, Georgia, AMS CP 1, AMS Contributed Paper Session

1003-34-510 **Xuming Xie*** (xxie@jewel.morgan.edu), Dept. of Math., Morgan state University, Baltimore, MD 21251. *Existence, selection and stability of needle crystals.*

This talk concerns the existence of solutions to a steady needle crystal growth problem in an one-sided model. We rigorously prove that for small nonzero anisotropy γ, analytic symmetric needle crystal solutions exist in the limit of surface tension ϵ^2 if only if the parameter $\beta = 2^{9/7}\gamma\epsilon^{-8/7}$ is in a discrete set of values; this is the so called "selection principle". It is also proven that for $\gamma = 0$, there can be no symmetric classical needle crystal solution.

We will also address the linear stability analysis of steady needle crystals. When surface tension is zero, it is proven that all steady solution (Invantsov solutions) are unstable. When surface tension is nonzero, all branches of steady solutions except for the fastest branch are unstable. (Received September 17, 2004)