

**Meeting:** 1004, Bowling Green, Kentucky, SS 13A, Special Session on Nonlinear Analysis and Applied Mathematics

1004-49-99            **Qinglan Xia\*** (qlxia@math.utexas.edu), University of Texas at Austin, Department of Mathematics, Austin, TX 78712. *A variational problem on the formation of mud cracking.*

In this talk, I will present a variational model targeting at the formation of mud cracking. We study the boundary of sets minimizing a quasi perimeter  $T(E) = P(E, \Omega) + G(E)$  with a volume constraint. Here  $\Omega$  is any open subset of  $\mathbb{R}^n$  with  $n \geq 2$ ,  $G$  is a lower semicontinuous function on sets of finite perimeter satisfies a condition that  $G(E) \leq G(F) + C |E \Delta F|^\beta$  among all sets of finite perimeter with equal volume. We show that under the condition  $\beta > 1 - \frac{1}{n}$ , any volume constrained minimizer  $E$  of the quasi perimeter  $T$  has both interior points and exterior points, and  $E$  is indeed a quasi minimizer of perimeter without the volume constraint. Using a well known regularity result about quasi minimizers of perimeter, we get the classical  $C^{1,\alpha}$  regularity for the reduced boundary of  $E$ . (Received January 19, 2005)