

APPLIED MATHEMATICS COLLOQUIUM

WALLS FORMED BY BENDING: GRAIN BOUNDARIES AND CELL WALLS FROM CONTINUUM PLASTICITY

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ABSTRACT:

In condensed-matter physics, crystals are anomalous. Most phases (liquid crystals, superfluids, superconductors, magnets) respond smoothly in space when strained. Crystals, when bent (an imposed rotation gradient) respond by forming sharp walls separating grains or cells. These walls are well understood microscopically, but until now science has had no simple, continuum explanation for their formation. We've discovered that these walls are explained naturally as shock fronts in a continuum theory of plasticity. Our theory (1) keeps track of the topological dislocation density tensor, (2) is derived from the microscopic dynamics using a simple closure approximation, and (3) connects directly to engineering descriptions of strain, stress, and rotation on longer length scales.

MONDAY, OCTOBER 24, 2005

4:30 PM

Building 2, Room 105

*Reception at 4:00 PM in Building 4, Room 174.
(Math Majors Lounge)*

Applied Math Colloquium: <http://www-math.mit.edu/amc/fall05>
Math Department: <http://www-math.mit.edu>



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