

PHYSICAL MATHEMATICS SEMINAR

Elasticity, Geometry and Buckling

ANDREJ KOŠMRLJ
Harvard University

ABSTRACT:

In this talk I present how geometrical shape affects the mechanical properties of thin solid membranes and how buckling instabilities change the geometry of periodic microstructures in materials. Using methods rooted in statistical mechanics, we find that random shape fluctuations and thermal excitations of thin solid membranes significantly modify their mechanical properties. Membranes subject to such fluctuations are much harder to bend, but easier to stretch, compress and shear. I will also comment on the relevance of these results for long ribbons, which behave like one-dimensional semiflexible polymers, but also show some features of two-dimensional membranes. Finally, I show how methods from solid state physics can help us deduce the geometry of buckled periodic microstructures. Buckling instabilities can change the microstructure symmetries, including a spontaneous chiral symmetry breaking, which drastically modifies the material properties.

TUESDAY, MAY 5, 2015

2:30 PM

Building E18, Room 466A

*Reception following in Building E17, Room 401A
(Math Dept. Common Room)*

<http://math.mit.edu/pms/>