

PHYSICAL MATHEMATICS SEMINAR

Differential Growth and the Shape of Leaves & Petals

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ABSTRACT:

Various qualitative and quantitative aspects of the undulating patterns seen in both vascular and avascular leaves & petals may be ascribed to the differential growth of the underlying tissue. We studied the static shape of lily leaves and the dynamic deployment of petals during blooming in the asiatic lily. A combination of surgical manipulations and observations confirms this mechanism, which is further demonstrated in a simple experiment of stretched foam ribbons. We quantify the observations with a mathematical model complemented with numerical simulations. We find that as the differential growth increases, the initial flat or doubly-curved ribbon bends to catenoidal shape and further undulations appear on the catenoid's edges. It suggests new biomimetic designs for deployable structures using edge-driven actuation rather than the usual surface-driven actuation.

TUESDAY, MARCH 9, 2010

2:30 PM

Building 2, Room 105

*Refreshments at 3:30 PM in Building 2, Room 290
(Math Department - Common Room)*



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