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A growing Leaf as a Sheet of an Active Solid

ERAN SHARON, The Hebrew University

A growing leaf is a thin sheet of active solid, which expands while obeying the laws of mechanics. The effective rheology of this active solid is nontrivial, allowing the leaf to increase its area by orders of magnitude, keeping its "proper" geometry. The questions of what the characteristics of the leaf growth field are and how it is regulated without any central "headquarter" are still open. I will present measurements of natural leaf growth with high time and space resolution. These show that the growth is a highly fluctuating process in both time and space. We suggest that the entire statistics of the growth field, not just its averages contain information important for the understanding of growth regulation. In another set of experiments we measure the effect of mechanical stress on deformation and growth. The measured effective rheology is viscoelastic with time varying parameters, indicating remodeling of the tissue in response to extended application of mechanical stress.