

Minimizing the elastic energy by conformal growth: the case of *Monstera deliciosa*

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Abstract

Recently, many attempts have been made to determine the stress-free deformation triggered by two-dimensional growth. We show that stress free configurations are simply given by the time evolution of a conformal mapping which concerns not only the boundary but arbitrary displacement inside the sample. For the general cases, natural fresh leaves almost in planar shape and their shape can be easily represented by holomorphic functions. By adjusting the mathematical shape function, their different morphologies of three main characteristics, tip, undulating borders and veins, can be mathematically recovered with consistency with observations. It is worth mentioning that this flexible method allows to study complex morphologies of growing leaves such as the fenestration process in *Monstera deliciosa* and can shed light on many other 2D biological patterns.