

Our next seminar speaker is: Dr. Arik Yochelis, The Department of Solar Energy and Environmental Physics, Ben Gurion University of the Negev

Title: "*Nonlinear Initiation of Side-Branching by Morphogenesis*"

Abstract:

An understanding of the underlying mechanism of side-branching is paramount in controlling and/or therapeutically treating mammalian organs, such as lungs, kidneys, and glands. Motivated by an activator-inhibitor-substrate approach that is conjectured to dominate the initiation of side-branching in a pulmonary vascular pattern, I demonstrate a distinct transverse front instability in which new fingers grow out of an oscillatory breakup dynamics at the front line without any typical length scale. These two features are attributed to unstable peak solutions in 1D that subcritically emanate from Turing bifurcation and that exhibit repulsive interactions. As such, the generation of finite-amplitude transversely localized oscillations at the front line represents a template from which localized physical structures develop in the transverse direction in 2D. The results are based on bifurcation analysis and numerical simulations and provide a potential strategy for developing a framework of side-branching for other biological systems, such as plant root hairs, cancer, cellular protrusions, and even somitogenesis.

The seminar will be held on 9.11.21 at 11:00 at the environmental physics seminar.