

The FAU-SIAM student chapter invites you to a talk by

## Punit Gandhi, Ph.D.

Assistant Professor in the Department of Mathematics and Applied Mathematics at Virginia Commonwealth University



Thursday December 3, 2020

11:00am EST

Open to all and live on [Zoom](#) with the passcode Fall2020

## Using pattern formation in the presence of spatial heterogeneity to learn about dryland ecosystems

### Abstract

Regular spatial patterns in the vegetation growth of dryland ecosystems are thought to arise through self-organization in response to water scarcity. This behavior has been qualitatively reproduced by reaction-advection-diffusion systems that model various interactions between the plants and their environment. The patterns most often appear on very gentle slopes as bands of vegetation separated by bare soil with characteristic length scales on the order of 100 meters. I will use a simple modeling framework and an idealized topography to discuss the role of water transport in determining (1) the shape of individual vegetation bands and (2) the region of the landscape occupied by vegetation patterns. The results are in qualitative agreement with observations from remote sensing data, and suggest that the placement of the patterns relative to ridges and valleys on the terrain may provide some indication of resilience to ecosystem collapse under aridity stress.

### About the speaker

Dr. Gandhi is an Assistant Professor in the Department of Mathematics and Applied Mathematics at Virginia Commonwealth University (VCU). He earned a Ph.D. in Physics at UC Berkeley in 2016, and completed a three-year postdoc at the Mathematical Biosciences Institute at Ohio State University before joining the faculty at VCU in 2019. His main research interests are in the application of dynamical systems and bifurcation theory to model emergent spatio-temporal patterns in complex systems.

Please contact us for more information about our student chapter!

*Email:* [siam@fau.edu](mailto:siam@fau.edu)

*Website:* <http://www.math.fau.edu/siam/index.php>