



Sommersemester 2021

Dresdner Mathematisches Seminar

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Modeling and topological methods to better understand skin-pattern formation in zebrafish

Abstract

Many natural and social phenomena involve individual agents coming together to create group dynamics, whether the agents are drivers in a traffic jam, voters in an election, or pedestrians in a crowded room. Self-organization also occurs at much smaller scales in biology, though, and here I will focus on elucidating how brightly colored cells interact to form skin patterns in zebrafish. Wild-type zebrafish are named for their dark and light stripes, but mutant zebrafish feature variable skin patterns, including spots and labyrinth curves. All these patterns form as the fish grow due to the interactions of tens of thousands of pigment cells. This leads to the question: how do cell interactions change to create mutant patterns? The longterm motivation for my work is to help shed light on this question and better link genes, cell behavior, and visible animal characteristics. Toward this goal, we combine different modeling approaches (including agent-based and continuum) to simulate pattern formation and make experimentally testable predictions. In this talk, I will overview my models and highlight how topological data analysis can be used to quantitatively compare *in silico* and *in vivo* data on cellular organization.

Mittwoch, 28.04.2021, 17:00 Uhr

Leitung: Jun.-Prof. Dr. Markus Schmidtchen

Das DMS findet virtuell über Zoom statt. Der virtuelle Raum ist über folgenden Link erreichbar:

<https://tu-dresden.zoom.us/j/85777722193?pwd=THhvV2dQTUY2T1BETmk0bGNhdnlWdz09>

Meeting ID: 857 7772 2193, Passcode: hp5^Lx

**Bereich Mathematik und
Naturwissenschaften**

Fakultät Mathematik