



Berlin
Mathematical
School

BMS Friday Colloquium

Friday 29 November 2013 at 14:15

Tea & Cookies starting at 13:00 in the BMS Lounge, MA2-2

TU Berlin, Room MA005, Straße des 17. Juni 136, Berlin

Martin Burger

(WWU Münster)

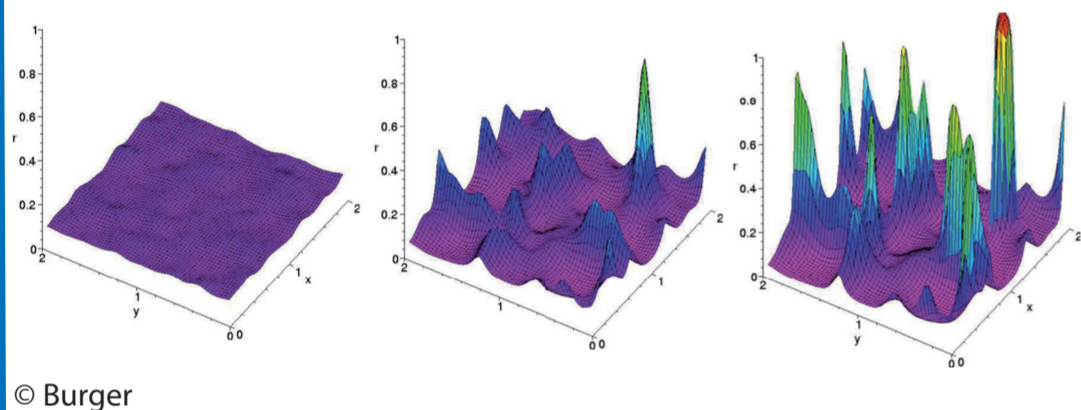
Mathematics of Collective Behaviour – Complex Patterns and Minimal Models

The mathematical modelling of collective behaviour of organisms has been receiving increasing attention in recent years. Examples include the formation of consensus in human societies, herding of sheep and of market traders, insect swarming, bird flocking, or collective cell migration and chemotaxis. Although those processes take place on different scales and produce a variety of complex patterns, they share a surprisingly similar structure.

In his talk, Burger will provide an overview of the modelling from a mathematician's viewpoint and demonstrate that (besides pre-existing patterns in the environment) the main source of pattern formation is an interaction of two effects, namely long-range attraction and short-range repulsion. In macroscopic models based on partial differential equations, this typically means a combination of a (nonlinear) diffusion term with an integral operator.

In order to understand this interplay, minimal mathematical models will be derived and analyzed, which contribute strongly to the understanding of basic mechanisms of pattern formation and phase transitions with respect to system parameters as found in real data and detailed microscopic simulations.

Martin Burger is a professor of applied mathematics at Westfälische Wilhelms-Universität Münster. His research interests include inverse problems and mathematical imaging with applications in the life sciences. He did his doctorate and habilitation at Johannes Kepler University Linz in 2000 and 2005 respectively. From 2003 to 2004, he was CAM Assistant Professor at UCLA. He began his full professorship at WWU Münster in 2006.



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