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Michael Winkler is a professor at the University of Paderborn, Germany. He received his diploma in mathematics from the University of Paderborn in 1998, and his Ph.D. from the Aachen University of Technology in 2000. He was a post-doc at the Comenius University in Bratislava in 2003, 2004 and 2006, and he was a professor at the University of Duisburg-Essen from 2008 to 2011. His research interests are in the field of partial differential equations and systems, especially of parabolic type, with a particular focus on the spontaneous emergence of singularities, on effects of nonlinear and degenerate diffusion, and on qualitative behavior in cross-diffusion systems.

Title: Facets of complexity in chemotactic aggregation

Abstract:

Keller-Segel type cross-diffusion systems have been playing an outstanding role in the understanding of various patterning phenomena in biology. Concentrating on issues of predominant application relevance, the description of taxis-driven explosions has been among the most challenging topics in their analysis, and a natural focus of the literature in this regard is on the characterization of solution behavior near collapse. The presentation aims at reporting both on classical and on some recent developments, with a particular focus on the identification of circumstances under which solutions either must blow up at single points only, or alternatively may form singularities throughout larger regions in space.