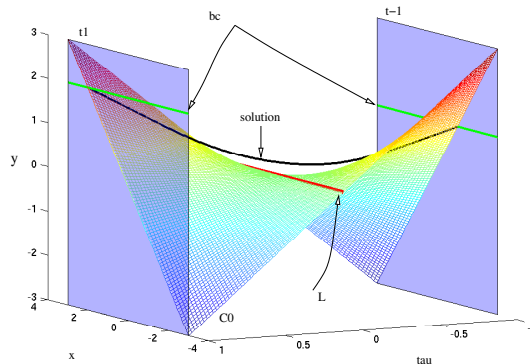


Friday 7 July 2023 at 14:15

FU Berlin, Computer Science Building, Room T9.028

Tea & Cookies starting at 13:00!



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Christian Kuehn

(TUM)

Multiscale Dynamics: From Finite to Infinite

Systems with multiple time scales appear in a wide variety of applications. Yet, their mathematical analysis is challenging already in the context of ordinary differential equations (ODEs), where about four decades were needed to develop a more comprehensive theory based upon invariant manifolds, geometric desingularization, asymptotic analysis, and many other techniques that span across the mathematical sciences. This framework has become known as geometric singular perturbation theory (GSPT). Yet, for partial differential equations (PDEs) progress has been extremely slow due to many obstacles in generalizing several ODE methods.

In this talk, Kuehn will first provide an introduction to multiple time scale dynamics and then outline several recent advances for fast-slow PDEs: (1) the extension of slow manifold theory for unbounded operators driving the slow variables, (2) the design of blow-up methods for PDEs, where normal hyperbolicity is lost and (3) amplitude/modulation theory for slowly-driven pattern forming systems. These advances provide one (of many) needed building blocks to understand the dynamics of multiscale PDEs.

Christian Kuehn is professor of Mathematics at the Technical University of Munich (TUM). He received his PhD from Cornell University in 2010. Postdoctoral positions took him to the Max Planck Institute for the Physics of Complex Systems in Dresden and the Vienna University of Technology, where he got his habilitation in applied mathematics in 2016 before settling in Munich. He received the Lichtenberg professorship at the TUM in 2016 and was awarded the Richard-von-Mises Prize in 2017. His research interests include applied mathematics, complex systems, differential equations, dynamical systems, numerical mathematics, and stochastics.

This talk will be the last MATH+ Friday Colloquium of the summer semester 2023 and we will come together afterwards to celebrate the end of the semester with the MATH+ Summer Party at FU Berlin. The whole MATH+ community is welcome to join! 