A Generalized Hartman-Grobman Theorem for Skew-Product Flows

Benjamin Rogoll (TU Dresden)

Abstract:
Linear differential equations are among the most accessible classes of ODEs and serve as a fundamental tool for understanding the local behavior of more complex, nonlinear systems. A central question in the qualitative theory of differential equations is whether a nonlinear system can be (locally) topologically conjugate to a linear one–at least in the neighborhood of trivial or equilibrium solutions. For autonomous systems, this is addressed by the classical Hartman-Grobman theorem, developed in the 1960s. Its extension to non-autonomous systems was pioneered by Palmer in the 1970s and further developed in recent decades, notably by Barreira and Valls in 2011.

In this talk, we revisit the result of Barreira and Valls and extend it to a broader class of non-autonomous systems–namely, **skew-product flows**. After introducing this class of systems and motivating its relevance, we present a novel concept of equivalence adapted to this setting. Using this framework, we prove a generalized version of the Hartman-Grobman type theorem by Barreira and Valls, allowing for more flexibility and future extensions.