



FMSP Lectures

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Shilnikov chaos due to state

-dependent delay,

by means of the fixed point index

October 22 (Thu) 17:00 ~ 17:50 Room 002

Abstract:

What can variability of a delay in a delay differential equation do to the dynamics? We find a bounded delay functional $d(\phi)$, with $d(\phi) = 1$ on a neighborhood of $\phi = 0$, such that the equation $x'(t) = -ax(t - d(x_t))$ has a solution which is homoclinic to 0, with shift dynamics in its vicinity, whereas the linear equation $x'(t) = -ax(t - 1)$ with constant time lag, for small solutions, is hyperbolic with 2-dimensional unstable space.

The proof involves regularity properties of the semiflow close to the homoclinic loop in the solution manifold and a generalization of a method due to Piotr Zgliczynsky which uses the fixed point index and a closing argument in order to establish shift dynamics when certain covering relations hold. (Joint work with Bernhard Lani-Wayda)