



FMSP Lectures

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How should a drop of liquid on a smooth curved surface move in zero gravity?

October 30 (Fri) 16:30 ~ 17:45 Room 128

Abstract:

Questions such as this may be formulated as questions regarding solutions to nonlinear evolutionary partial differential equations having a small coefficient on the leading order derivative term. Evolutionary partial differential equations may be regarded as (semi-) dynamical systems in an infinite-dimensional space. An abstract theorem is proved giving the existence of an invariant manifold for a semi-dynamical system when an approximately invariant manifold exists with a certain topological nondegeneracy condition in a neighborhood. This is then used to prove the existence of eternal solutions to the nonlinear PDE and answer the question about the motion of a droplet on a curved manifold. The abstract theorem extends fundamental work of Hirsch-Pugh-Shub and Fenichel on the perturbation of invariant manifolds from the 1970's to infinite-dimensional semi-dynamical systems.

This represents joint work with Kening Lu and Chongchun Zeng.