

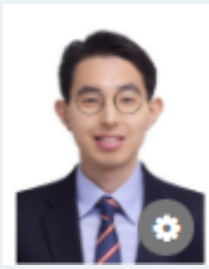
JIHOON LEE

Professor of Mathematics

Department of Mathematics, Chonnam National University, Republic of Korea

RESEARCH & COLLABORATION PROFILE

KEY WORDS: Infinite-Dimensional Dynamics, PDEs, Fredholm Theory, Exponential Dichotomy, Invariant Manifolds, Morse–Smale Systems



Research Snapshot. My research concerns infinite-dimensional dynamical systems and the long-term behavior of nonlinear PDEs. I use Fredholm theory, exponential dichotomy and admissibility to study hyperbolicity, invariant manifolds and structural properties, with applications to reaction–diffusion and damped wave equations, finite-dimensional reduction and perturbation problems.

RESEARCH EXPERTISE

- **Infinite-dimensional dynamics:** qualitative analysis of evolution equations and the structure of nonlinear PDE flows.
- **Linear and nonlinear analysis:** Fredholm operators, exponential dichotomy and admissibility in dynamical systems.
- **Invariant and inertial manifolds:** regularity, persistence, inertial forms and finite-dimensional reduction.
- **Hyperbolicity and genericity:** Sard–Smale methods, generic hyperbolicity and Morse–Smale systems.
- **Model equations:** reaction–diffusion and damped wave equations, including Chafee–Infante type problems.

RECENT RESEARCH HIGHLIGHTS

- **Fredholm theory under ADP/APC:** analysis of Fredholm properties under ADP/APC assumptions and their role in PDE dynamics.
- **Generic hyperbolicity:** Sard–Smale approaches to genericity and the structure of equilibria and dynamical systems.
- **Weighted admissibility:** trajectory-weighted admissibility and the construction of C^1 invariant manifolds.
- **Perturbation of reduced dynamics:** inertial manifold perturbation for damped wave and reaction–diffusion equations, including singular and domain perturbations.

POTENTIAL COLLABORATION RESEARCH

Collaborator areas: PDE dynamics | nonlinear functional analysis | evolution equations | spectral and Fredholm methods

- **PDE dynamics and genericity:** study hyperbolicity, transversality and Morse–Smale structures in dissipative evolution equations.
- **Fredholm and admissibility methods:** develop operator-theoretic tools for linearized flows and invariant manifold problems.
- **Invariant and inertial manifolds:** investigate regularity, persistence and finite-dimensional descriptions of PDE dynamics.
- **Singular and domain perturbations:** analyze stability of invariant structures and reduced dynamics as equations or spatial domains vary.

SELECTED RECENT PUBLICATIONS

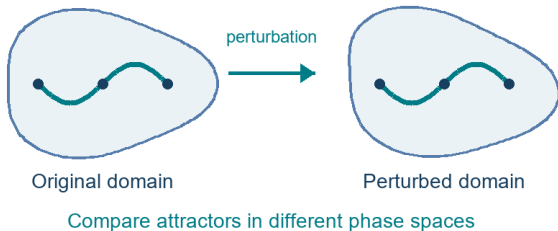
- J. Lee, N. Nguyen and V. M. Toi. “Gromov-Hausdorff stability of global attractors of reaction diffusion equations under perturbations of the domain.” J. Differential Equations 269 (2020), 125–147.
- J. Lee, N. Nguyen and L. Pires. “Global attractors of generic reaction diffusion equations under Lipschitz perturbations.” J. Math. Anal. Appl. 528 (2023), 127534.
- J. Lee and T. Nguyen. “Stability of inertial manifolds for semilinear parabolic equations under Lipschitz perturbations.” Nonlinear Anal. Real World Appl. 81 (2025), 104219.

CONTACT

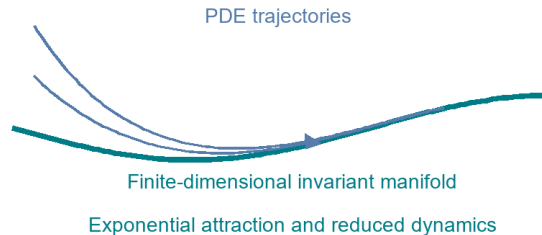
jihoon@jnu.ac.kr

Department of Mathematics | Chonnam National University

GLOBAL ATTRACTOR STABILITY



INERTIAL MANIFOLDS



Conceptual illustrations of the research themes; curves are schematic.