

Rigorous integration of dissipative PDEs with periodic boundary conditions

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We explain how to do rigorous numerics for dissipative PDEs with periodic boundary conditions and how to use finite dimensional tools from dynamics in the context of dissipative PDEs. This will be illustrated on the example of the proof of the existence of symbolic dynamics for the Kuramoto-Sivashinsky PDE on the line: a semiconjugacy with the Bernoulli shift, the existence of countably many periodic orbits and homo- and heteroclinic connections between them. [1, 2, 3]

References

- [1] D. Wilczak, P. Zgliczyński, A geometric method for infinite-dimensional chaos: Symbolic dynamics for the Kuramoto-Sivashinsky PDE on the line, *J. Diff. Eq.*, 269/10 (2020), 8509–8548.
- [2] D. Wilczak, P. Zgliczyński, Self-consistent bounds method for dissipative PDEs, <https://arxiv.org/abs/2502.09760>, in review.
- [3] D. Wilczak, P. Zgliczyński, Symbolic dynamics for the Kuramoto-Sivashinsky PDE on the line: connecting orbits between periodic orbits