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pour la dynamique en grande dimension
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Validation of a Hopf bifurcation in the Kuramoto-Sivashinky equation

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The Kuramoto-Sivashinsky equation in one spatial dimension with periodic boundary conditions in space is

$$\begin{cases} \partial_t u = -\partial_x^4 u - \gamma \partial_x^2 u + \partial_x(u^2), \\ u(t,x) = u(t, x + 2\pi). \end{cases} \tag{1}$$

Through a blow up procedure in the neighborhood of a (numerically determined) Hopf bifurcation, we desingularise this system by writing u as the sum of a stationary solution y and a time-dependent space and time periodic perturbation az, with a small, and we solve for a, y and z. We rigorously follow the curve of solutions of the desingularised system, that we parametrise by s. Proving that the time periodic perturbation has amplitude zero for a unique s^*, we rigourously conclude that a unique Hopf bifurcation occurs.

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