

Proof of the pitchfork bifurcation in the Kuramoto-Sivashinsky equation.

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Abstract

We will sketch proof of the pitchfork bifurcation for $\mu = 1$ in the Kuramoto-Sivashinsky equation

$$u_t = (u^2)_x - u_{xx} - \mu u_{xxxx}$$

with odd and periodic boundary conditions. More exactly, we will discuss how to show that the fixed point $u = 0$ is hyperbolic for $\mu \neq 1$ close to 1 and that after bifurcation two hyperbolic fixed points are born, to which there are heteroclinic connections from the origin. In proof unstable manifold theorem and normal forms methods are used.