# BIFURCATION OF EQUILIBRIA FOR THE CHAFEE-INFANTE SYSTEM ON A SQUARE

JOSÉ CARLOS FERNANDES DE OLIVEIRA

We study the local bifurcations from zero of equilibrium points of the dynamical system $\{\mathcal{S}_\lambda(t) : t \geq 0\}$, defined by the family of solution-operators at time-$t \geq 0$, $\mathcal{S}_\lambda(t) : \varphi \in H_0^1(Q) \mapsto \mathbf{u}(t) \in H_0^1(Q)$, where $\mathbf{u}(t)(x,y) \equiv u(t,x,y)$ is the mild solution of the semilinear parabolic scalar equation $u_t = \Delta u + \lambda(u - du^3),\ t > 0,\ (x,y) \in Q$, satisfying the Dirichlet boundary condition $u(t,x,y) = 0, t \geq 0, (x,y) \in \partial Q$, and the initial condition $u(0,x,y) \equiv \varphi(x,y)$, where $Q$ denotes the square $]0,\pi[\times]0,\pi[$, $\partial Q$ the boundary of $Q$, $\lambda$ and $d$ positive constants, $H_0^1(Q)$ the closure of $C_0^\infty(Q)$ in the Sobolev space $H^1(Q) = W^{1,2}(Q)$, with respect to the inner product $\left\langle \varphi_1, \varphi_2 \right\rangle_{H^1} = \left\langle \varphi_1, \varphi_2 \right\rangle_{L^2} + \left\langle \nabla\varphi_1, \nabla\varphi_2 \right\rangle_{L^2}$.

A typical result we can prove states that, when $\lambda$ crosses from the left the value 50, which is an eigenvalue with multiplicity 3, of $\Delta$ on $H_0^1(Q) \cap W^{2,2}(Q)$, there appears $3^3 - 1 = 26$ nontrivial distinct equilibrium points near zero.

(José Carlos Fernandes de Oliveira) Departamento de Matemática, Universidade Federal do Pará

*E-mail address*: zecarlos@ufpa.br