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Periodic Orbits for Dissipative PDEs

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Abstract: We discuss the results on the existence of periodic orbits for the Brusselator system with diffusion

$$\begin{cases} u_t = d_1 u_{xx} - (B+1)u + u^2 v + A\sin(x) \text{ for } (x,t) \in (0,\pi) \times (0,\infty), \\ v_t = d_2 v_{xx} + Bu - u^2 v \text{ for } (x,t) \in (0,\pi) \times (0,\infty), \\ u(t,x) = v(t,x) = 0 \text{ for } (x,t) \in \{0,\pi\} \times (0,\infty), \end{cases}$$

and for the nonautonomous Chafee-Infante equation

$$\begin{cases} u_t = u_{xx} + \lambda u + (A\sin(2\pi t) + B)u^3, \text{ for } (x,t) \in (t^0,\pi) \times (0,\infty), \\ u(t,x) = 0 \text{ for } (x,t) \in \{0,\pi\} \times (t^0,\infty). \end{cases}$$

The proofs are computer-assisted and based on interval arithmetic and rigorous integration of dissipative systems. Moreover, for the Chafee-Infante equation, we prove that the periodic orbits are locally attracting.