ICM 1998, Berlin, Aug. 18–27

Abstracts of Short Communications and Posters

Section:

10. Partial Differential Equations

1991 MS Classification: 35B32,35K57

Scheel, Arnd, FU Berlin, Germany; Sandstede, Björn, Ohio-State, USA

Essential instability of pulses amd bifurcations to modulated travelling waves

Reaction-diffusion systems on the real line are considered. Localized travelling waves become unstable when the essential spectrum of the linearization about them crosses the imaginary axis. We show that this transition to instability is accompanied by the bifurcation of a family of large patterns which are a superposition of the primary travelling wave with steady spatially-periodic patterns of small amplitude. The bifurcating patterns can be parametrized by the wave length of the steady patterns; they are time-periodic in a moving frame. Linearized stability is shown to follow from stability of the primary pulse together with linear stability of the asymptotic spatially-periodic pattern. A major difficulty in analyzing this bifurcation is its genuinely infinite-dimensional nature. In particular, finite-dimensional Lyapunov-Schmidt reductions or center-manifold theory do not seem to be applicable to pulses having their essential spectrum touching the imaginary axis.