Heterogeneous and self-organized pacemakers in oscillatory and excitable media

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A target pattern consists of concentric waves emitted by a wave source called pacemaker. We investigate pacemakers and target patterns in oscillatory and excitable reaction-diffusion systems. First, we discuss an oscillatory medium modeled by the complex Ginzburg-Landau equation. There, the oscillation frequency is locally modified, thus describing a pacemaker formed by a heterogeneity. Special emphasis is put on systems with negative dispersion and on wave sinks [1]. Second, we discuss a specific reaction-diffusion system consisting of three variables displaying excitable and oscillatory dynamics. The existence and stability of self-organized pacemakers even in the excitable regime of this system is demonstrated [2]. We compare these self-organized pacemakers to those present in birhythmic media [3].

[1] M.S. and A.S. Mikhailov, Z. Phys. Chem. 216 (2002), 521.
[2] M.S., T. Mizuguchi, A.S. Mikhailov, and Y. Kuramoto, in preparation.
[3] M.S., M. Ipsen, and A.S. Mikhailov, Phys. Rev. Lett 86 (2001), 4406.