Abstract for Dynamics Days Crete 2006
Topic: Pattern Formation

Stabilization of unstable rigid rotation of spiral waves in excitable media by feedback control

J. Schlesner*, V. Zykov, H. Engel, E. Schöll

TU Berlin, Hardenbergstr. 36, 10623 Berlin, Germany
* Electronic Address: schlesner@physik.tu-berlin.de

Depending on the parameters of excitable media, different regimes of rotation have been observed for spiral waves including rigid rotation, meandering and hypermeandering. These regimes can be unstable. Non-invasive feedback methods as time delayed feedback are frequently used to stabilize unstable orbits, for example in electric circuits or semiconductor heterostructures [1, 2]. Here a proportional and a time-delayed feedback algorithms are elaborated to stabilize rigid rotation in a parameter range where it is unstable in the absence of feedback[3]. As both control methods are non-invasive their application allows to determine the characteristic parameters of unstable rigid rotation. In our calculations the FHN model and the Oregonator model are taken as representative examples for excitable media. A latency time in the control loop shrinks the control domain for successful stabilization. We propose an effective method to overcome its destabilizing influence.

---

[1] W. Just, D. Reckwerth, J. Möckel, E. Reibold, and H. Benner, *Phys. Rev. Lett.* **81**, 562 (1998)

[2] J. Schlesner, A. Amann, N. B. Janson, W. Just, and E. Schöll, *Phys. Rev. E* **68**, 066208 (2003)

[3] J. Schlesner, V.S. Zykov, H. Engel, and E. Schöll, *Phys. Rev. E*, *submitted 2006*