

Global convergence of quorum-sensing networks

Giovanni Russo, Jean-Jacques E. Slotine

(Submitted on 30 Mar 2010)

In many natural synchronization phenomena, communication between individual elements occurs not directly, but rather through the environment. One of these instances is bacterial quorum sensing, where bacteria release signaling molecules in the environment which in turn are sensed and used for population coordination. Extending this motivation to a general non-linear dynamical system context, this paper analyzes synchronization phenomena in networks where communication and coupling between nodes are mediated by shared dynamical quantities, typically provided by the nodes' environment. Our model includes the case when the dynamics of the shared variables themselves cannot be neglected or indeed play a central part. Applications to examples from systems biology illustrate the approach.

Comments: 36 pages

Subjects: **Dynamical Systems (math.DS)**; Adaptation and Self-Organizing Systems (nlin.AO); Biological Physics (physics.bio-ph); Cell Behavior (q-bio.CB)

Cite as: [arXiv:1003.5704v1](#) [math.DS]

Submission history

From: Giovanni Russo [[view email](#)]

[v1] Tue, 30 Mar 2010 00:20:17 GMT (3271kb)

[Which authors of this paper are endorsers?](#)

Download:

- [PDF](#)
- [PostScript](#)
- [Other formats](#)

Current browse context:

math.DS

[< prev](#) | [next >](#)

[new](#) | [recent](#) | [1003](#)

Change to browse by:

[math](#)

[nlin](#)

[nlin.AO](#)

[physics](#)

[physics.bio-ph](#)

[q-bio](#)

[q-bio.CB](#)

References & Citations

- [CiteBase](#)

[1 blog link](#)(what is this?)

[Bookmark](#)(what is this?)

[CiteULike logo](#)

[Connotea logo](#)

[BibSonomy logo](#)

[Mendeley logo](#)

[Facebook logo](#)

[del.icio.us logo](#)

[Digg logo](#)

[Reddit logo](#)