Moving average network examples for asymptotically stable periodic orbits of strongly monotone maps

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Given a graph Γ, the discrete–time dynamical system

$$(x_{1,t},\dots,x_{I,t}) = \mathbf{x}_t \ \to \ \mathbf{x}_{t+1} = \mathbf{F}(\mathbf{x}_t)\ , \quad t = 0,1,\dots$$

on the I–dimensional unit cube $[0,1]^I$ is considered where

$$(\mathbf{F}(\mathbf{x}_t))_i = F(\bar{x}_{i,t})\ , \quad i = 1,\dots,I\ ,$$

$F : [0,1] \to [0,1]$ is a strictly increasing continuous function,

$$\bar{x}_{i,t} = \frac{1}{n_i}\sum_{j\in N_i} x_{i,t}\ ,$$

i is a vertex of Γ, and N_i is the set of its neighbouring vertices with $n_i = \mathrm{card}(N_i) \neq 0$.

Conditions for the existence of a globally asymptotically stable fixed point as well as a variety of examples for asymptotically stable nontrivial periodic orbits is presented. The motivation comes from modelling local interactions in tax evasion [1].

The talk is based on joint work with *Judit Várdai*.

References

[1] Barnabas M. Garay, András Simonovits, János Tóth, *Local interaction in tax evasion*, Economics Letters **115** (2012), 412–415.