

Natalia Janson (Department of Mathematics, Loughborough University)

Peter Kloeden (Mathematical Institute, University of Tuebingen)

A dynamical system with a self-organising vector field – a conceptual model of a cognitive system

Abstract

The talk introduces and analyses mathematically an intriguing model introduced in N.B. Janson and C.J. Marsden. The model is novel in both its approach to modelling cognitive systems as well as in its mathematical structure: a vector field describing the dynamics is generated in response to external stimuli — the model has essentially a plastic self-organising velocity field.

After a brief introduction and statement of the system by Peter Kloeden, Natalia Janson will motivate the model in a non-technical terms. Peter Kloeden will then provide a mathematical analysis of the existence and uniqueness of solutions and their dynamical properties (at a graduate student level). Natalia will then summarise and discuss the results.

References

1. N.B. Janson and C.J. Marsden, Dynamical system with plastic self-organized velocity field as an alternative conceptual model of a cognitive system, *Scientific Reports*, 7 (2017), 17007 plus Supplementary Note.
2. N.B. Janson and P.E. Kloeden, Mathematical consistency and long-term behaviour of a dynamical system with a self-organising vector field, *J. Dynamics & Diff. Eqns.* (2020) DOI: 10.1007/s10884-020- 09834-7
3. N.B. Janson and P.E. Kloeden, Robustness of a dynamical systems model with a plastic self-organising vector field to noisy input signals, *European Physical Journal Plus* (2021) 136:720 DOI: 10.1140/epjp/s13360-021-01662-y