



Meiji University Global COE Program

53th Mathematical Sciences based on



Modeling, Analysis and Simulation seminar

Date: June 21, 2012, 16:30~18:00

Location: Meiji Univ. Ikuta Campus, Build 2 Annex A, Room A207.

Yoshihiro Yamazaki (Waseda University)

Title : Collective behavior of bistable units with global and asymmetric local interactions

Abstract : Recently we have extracted the following dynamical system from the experiment of peeling an adhesive tape[1].

- (1) The system consists of bistable units affected by noise.
- (2) Between the units, there exist global and asymmetric local interactions.

Based on the above properties for the system, we have constructed the dynamical model [2] and the stochastic cell automaton model[3].

These models have the following characteristic properties.

- (a) Noise-induced bistability (from the dynamical model):
The existence of the noise alters the stability of the system from monostable to bistable.

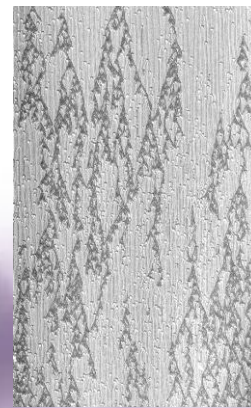
- (b) Spatio-temporal intermittency (from the stochastic cell automaton model):

The statistical and fractal properties, such as the existence of percolation threshold and power-law behaviors, are confirmed and consistent with the real experiments of peeling adhesive tape.

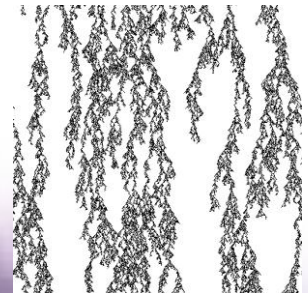
[1] Y. Yamazaki and A. Toda: Physica D 214 (2006) 120-131

[2] Y. Yamazaki: Prog. Theor. Phys. 125 (2011) 641-652.

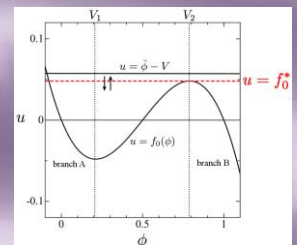
[3] Y. Yamazaki, K. Yamamoto, D. Kadono, and A. Toda: J. Phys. Soc. Jpn. 81 (2012) 043002 (3 pages)



Spatio-temporal patterns on peeled adhesive tapes



Stochastic CA model



Nullcline of the bistable units affected by noise

Everyone is welcome to attend the MAS seminar.

Meiji institute for Advanced Study of Mathematical Science (<http://www.mims.meiji.ac.jp>)

(Organizers: M. Mimura, D. Ueyama, Y. Wakano, K. Ikeda and S.Kinoshita)

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Access: 10 minutes on foot from Ikuta St. Odakyu line,
Or 10 minutes by bus No. 13「明治大学正門前」, get off at the last stop.
See http://www.meiji.ac.jp/koho/campus_guide/ for details.