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数理解析研究所講究録 1191

非線形散逸系の界面・パルス・波動

京都大学数理解析研究所
2001年2月
RIMS Kokyuroku 1191

RIMS Project 2000 "Reaction-diffusion systems: theory and applications"

Interfaces, Pulses and Waves in Nonlinear Dissipative Systems

February, 2001

Research Institute for Mathematical Sciences

Kyoto University, Kyoto, Japan
Preface

This volume contains a collection of 17 papers presented at the International symposium on Interface, Pulses and Waves in Nonlinear Dissipative Systems. The symposium was held at Research Institute for Mathematical Sciences (RIMS) at Kyoto University, Kyoto, Japan from 28 to 31 August 2000. This was one of the series of symposium organized as RIMS Project 2000 on "Reaction-diffusion systems: theory and applications". More than 50 participants attended the symposium where they exchanged their vivid information in this area as well as sharing the ideas on a variety of topics discussed in this volume.

Although this symposium is basically in the field of Applied Mathematics, what we intended is to provide an opportunity to discuss recent advances not only in reaction-diffusion systems but also in the related topics studied by experimentalists and theoretical physicists. We believe that such a wider perspective will strengthen and develop Applied Mathematics further in the long run. The symposium was indeed very successful in deepening our understanding of Nonlinear Dissipative Systems.

We would like to thank all the speakers for their presentations of the highest quality and Professor M. Mimura, Professor H. Okamoto and Dr. M. Nagayama for their helpful advice and laborious efforts during and after the symposium.

January, 2001

Takao Ohta
Yasumasa Nishiura
Tsutomu Ikeda
RIMS Project 2000 "Reaction-diffusion systems: theory and applications"
Interfaces, Pulses and Waves in Nonlinear Dissipative Systems
28-31 August 2000

28 August
13:45 M. Mimura (Hiroshima)
Opening address
14:00-14:45 H. G. Purwins (Munster)
Quasiparticles in Reaction-Diffusion-Systems:
Experiment versus Theory
14:45-15:30 S. Nasuno (KIT)
Interacting spots in a quasi two-dimensional dc-driven
gas discharge system
15:30-16:00 break
16:00-16:45 Y. Hidaka (Kyushu)
Chevron-Wavy Pattern in Liquid Crystals

29 August
9:30-10:15 M. Chaplain (Dundee)
Reaction-diffusion equations on spherical surfaces:
Numerical simulation and application to tumour growth
modelling
10:15-10:30 break
10:30-11:15 M. Sano (Tokyo)
Calcium Wave Propagation in Networks
of Astrocyte-Neuron Culture
11:15-12:00 A. Mochizuki (Kyushu)
Mathematical models for biological pattern formation:
on cone mosaic of retina and strips of coating in fish.
13:30-14:15 F. Hamel (Universite Pierre et Marie Curie)
Front propagation in periodic media
14:15-15:00 T. Ikeda (Ryukoku) and M. Nagayama (Kyoto)
Numerical simulation of helical waves arising in self-
propagating high-temperature syntheses
15:00-15:30 break
15:30-16:15  Y. Yamazaki (Hiroshima)
            Front Aggregation and Labyrinthine Pattern
            in the Drying Process of Water-Granule Systems

16:15-17:00  A. Nomura (Yamaguchi Pref.)
            Chemotactic patterns in biological systems

30 August

9:30-10:15  E. Meron (Ben-Gurion)
            Spiral-Wave Nucleation

10:15-10:30  break

10:30-11:15  M. Mimura (Hiroshima) and S.-I. Ei (Yokohama City Univ.)
            Dynamics of travelling spots in reaction-diffusion systems

11:15-12:00  D. Ueyama (Hiroshima), Y. Nishiura (Hokkaido) and T. Yanagita
            (Hokkaido) A chaotic traveling pulse in discrete dissipative systems

13:30-14:15  M. Doi (NIT)
            Pattern Formation on the Free Surface of Bilayer Films

14:15-15:00  M. Kawaguchi (Mie)
            Hele-Shaw cell experiments of viscous fingering
            and bubble motion in polymer solutions

15:00-15:30  break

15:30-16:15  S. Tadaki (Saga)
            Can we explain the formation of congestion in
            expressways? (tentative)

16:15-17:00  K. Nakanishi (Nagoya)
            Traffic Models and a Solvable Difference-Differential
            Equation

31 August

9:30-10:15  R. Kapral (Tronto)
            Line Defects and Nonequilibrium Chemical Patterns

10:15-10:30  break

10:30-11:15  D. Takahashi (Waseda)
            Continuous, Discrete, Ultradiscrete waves

11:15-12:00  T. Okuzono (Hiroshima) and T. Ohta (Hiroshima)
            Self-propulsion of Cellular Structures in Chemically
            Reacting Mixtures
## Loczized Patterns in Planar Gas-Discharge Systems
Univ. of Muenster  
H.-G. Purwins

Univ. of Muenster  
Yu. A. Astrov

Univ. of Muenster  
I. Brauer

Univ. of Muenster  
M. Bode

## Interacting spots in a quasi two-dimensional dc-driven gas discharge system
九州工大・工  
那須野 悟(Satoru Nasuno)

## Chevron-Wavy Pattern in Liquid Crystals
九大・工学  
日高 芳樹(Yoshiki Hidaka)

## Patterns on the Fish Skins Induced by Anisotropy in Diffusion
九大・理学  
望月 敦史(Atsushi Mochizuki)

## Some existence, monotonicity and uniqueness results for pulsating travelling fronts in periodic media and periodic domains
CNRS-Univ. Paris VI  
F. Hamel

## Numerical simulation of helical waves arising in self-propagating high-temperature syntheses
龍谷大・理工  
池田 勉(Tsutomu Ikeda)

京大・数理研  
長山 雅晴(Masaharu Nagayama)

## Front Aggregation and Labyrinthine Pattern in the Drying Process of Water-Granule Systems
広大・理学  
山崎 義弘(Yoshihiro Yamazaki)

## Chemotactic Patterns in Biological Systems
山口県立大・国際文化  
野村 厚志(Atsushi Nomura)

## Spiral Wave Nucleation
Los Alamos National Lab.  
A. Hagberg

Ben-Gurion Univ.  
E. Meron

## A chaotic traveling pulse in discrete dissipative systems
広大・理学  
上山 大信(Daishin Ueyama)

北大・電子研  
西浦 廉政(Yasumasa Nishiura)

北大・電子研  
柳田 峯雄(Tatsuo Yanagita)
1. Pattern Formation on the Free Surface of Bilayer Films
   名工大・工
   土井 稔 (Minoru Doi)

2. Hele-Shaw Cell Experiments of Viscous Fingering and Bubble Motion in Polymer Solutions
   三重大・工
   川口 正美 (Masami Kawaguchi)

3. Can We Explain Traffic Congestion?
   佐賀大・理工
   只木 進一 (Shin-ichi Tadaki)

4. Traffic Models and a Solvable Difference-Differential Equation
   名大・理
   中西 健一 (Kenichi Nakanishi)

5. Synchronization Defect Lines in Media with Complex-Periodic Dynamics
   Univ. of Toronto
   Raymond Kapral

6. Continuous, Discrete, Ultradiscrete Waves
   早稲田大・理工
   高橋 大輔 (Daisuke Takahashi)

7. Self-Propulsion of Cellular Structures in Chemically Reacting Mixtures
   広大・理学
   奥田 透 (Tohru Okuzono)
   広大・理学
   太田 隆夫 (Takao Ohta)