

ISSN 1881-6193

RIMS Kôkyûroku Bessatsu B41

The breadth and depth of nonlinear discrete integrable systems

edited by Tetsuji Tokihiro

August, 2013

**Research Institute for Mathematical Sciences
Kyoto University**

RIMS Kôkyûroku Bessatsu B41

*The breadth and depth of
nonlinear discrete integrable systems*

August 20 ~22, 2012

edited by Tetsuji Tokihiro

August, 2013

Research Institute for Mathematical Sciences

Kyoto University, Kyoto, Japan

The papers presented in this volume of RIMS Kôkyûroku Bessatsu are in final form and refereed.
©2013 by the Research Institute for Mathematical Sciences, Kyoto University. All rights reserved.
Printed in Japan.

PREFACE

This volume of RIMS Kôkyûroku Bessatsu is a collection of research and survey articles which were contributed by invited speakers of the RIMS conference “The breadth and depth of nonlinear discrete integrable systems”, which was held at the Research Institute for Mathematical Sciences (RIMS) of Kyoto University from August 20 through August 22, 2012.

The aim of the conference was to overview recent developments in discrete nonlinear integrable systems and related topics. There were given 13 lectures and 83 participants during the conference. It is our pleasure that this volume collects 12 contributions from the speakers.

All papers here have been refereed and are in their final forms. We would like to express our sincere gratitude to all the participants, invited speakers and RIMS secretaries who have made the conference successful and the referees of articles of this volume.

Editor: Tetsuji Tokihiro (the University of Tokyo)

京都大学数理解析研究所研究集会
「非線形離散可積分系の拡がり」
(The breadth and depth of nonlinear discrete integrable systems)
2012年8月20日(月)～22日(水)

プログラム

8月20日(月)

13:15 - 14:30 広田良吾(早稲田大学)

パフィアンの加法公式

14:50 - 15:40 大久保直人(東京大学)

離散可積分系とクラスター代数

15:50 - 16:40 間瀬崇史(東京大学)

ローラン現象と離散可積分系

8月21日(火)

9:30 - 10:20 關戸啓人(京都大学)

離散可積分系と事前情報付き線形回帰モデル

10:30 - 11:20 上岡修平(京都大学)

格子路の組合せ論から見た可積分系とその周辺

11:40 - 12:30 村田実貴生(東京農工大学)

非可積分系の離散化と超離散化

13:30 - 14:30 大田佳宏(東京大学)

転写過程の超離散モデリングとシミュレーション

14:50 - 15:40 神吉雅崇

有限体上の可積分系について

15:50 - 16:40 高橋大輔(早稲田大学)

非自励粒子セルオートマトン

8月22日(水)

10:00 - 10:50 小林真平(弘前大学)

Dressing 作用による可積分系の差分化について

11:00 - 11:50 金井政宏(東京大学)

非平衡系のダイナミクスと特殊関数

13:00 - 13:50 土谷洋平(神奈川工科大学)

非線形シュレディンガー方程式の楕円関数解について

14:00 - 14:5 辻本諭(京都大学)

古典直交多項式の一般化と超可積分系

主催者： 時弘哲治(東京大学)

CONTENTS

PREFACE	i
プログラム (PROGRAM)	ii
パフィアンの加法公式 (Addition Formula for Pfaffians)	
Ryogo Hirota	1
Discrete Integrable Systems and Cluster Algebras	
Naoto Okubo	25
The Laurent Phenomenon and Discrete Integrable Systems	
Takafumi Mase	43
離散可積分系と事前情報付き線形回帰モデル (Discrete integrable systems and linear regression with prior information)	
Hiroto Sekido	65
格子路の組合せ論から見た可積分系とその周辺 (Integrable Systems from the Viewpoint of Lattice Path Combinatorics)	
Shuhei Kamioka	73
非可積分系の離散化と超離散化 (Discretization and ultradiscretization of non-integrable systems)	
Mikio Murata	85
Ultradiscrete Modeling and Simulation for Gene Transcription	
Yoshihiro Ohta and Sigeo Ihara	101
Discrete Painlevé equations and discrete KdV equation over finite fields	
Masataka Kanki, Jun Mada and Tetsuji Tokihiro	125
粒子セルオートマトンの非自励化および確率化について (On Deautonomization and Randomization of Particle Cellular Automata)	
Daisuke Takahashi, Hideki Kuwabara, Takatoshi Ikegami and Junta Matsukidaira	147
Dressing 作用による可積分系の差分化について (Discretization of integrable systems via dressing actions)	
Shimpei Kobayashi	161

非平衡系のダイナミクスと特殊関数 (Dynamics of nonequilibrium systems and the special functions)	
Masahiro Kanai	173
Construction of the exceptional orthogonal polynomials and its application to the superintegrable system	
Satoshi Tsujimoto	181