

数理解析研究所講究録 2186

RIMS 共同研究 (公開型)

偏微分方程式における逆問題と
その応用のさらなる展開

京都大学数理解析研究所

2021年6月

数理解析研究所講究録は、京都大学数理解析研究所の共同利用研究集会および共同研究の記録として1964年に刊行が開始されました。当研究所が全国共同利用研究所として発足した翌年のことでしたが、以来半世紀、毎年数十巻を刊行し、2016年には第2000巻が刊行されるに至りました。第1巻から第2000巻までに収録された論文数は29,265編、総頁数は342,960頁という膨大なものであり、最先端の数学・数理科学分野の研究状況を伝えるのみならず、我が国の数学・数理科学の発展の歴史を留める文献として、他に類例を見ない論文集となっています。

講究録の内容は当研究所のウェブサイトおよび京都大学の学術情報リポジトリにおいても公開され、年間の総アクセス数は1,380,032回（2017年度）を数えるなど、多数の方にご利用いただいています。

講究録の使用言語は論文著者の判断に任されていますが、結果的に日本語が多用されていることが特徴の一つとなっています。その結果、講究録は、数学・数理科学の広い領域における最先端の専門知識に母国語でアクセスできるものとして、近年の英語化の流れの中で、重要な文献となりつつあります。

当研究所の共同利用事業に参加し講究録の論文を執筆していただいた多数の方々に対し、講究録を大きく成長させていただいたことを深く感謝いたしますとともに、これからも、当研究所の国際共同利用・共同研究拠点(*)としての活動にご参加いただき、講究録の発展にご協力いただけますよう心よりお願い申し上げます。

*数理解析研究所は2018年11月13日、共同利用・共同研究拠点の認定が廃止され、新しく国際共同利用・共同研究拠点に認定されました。

講究録

Kôkyûroku

RIMS Kôkyûroku was started in 1964 as the proceedings of symposia, colloquia and workshops supported by RIMS, the Research Institute for Mathematical Sciences, Kyoto University. It was the next year of the establishment of RIMS as one of the Nationwide Cooperative Research Centers. For half a century since then, several dozen volumes have been issued each year, and the 2,000th volume was issued in 2016. The volumes of Kôkyûroku from the 1st through the 2,000th, containing enormous 29,265 articles and 342,960 pages, not only deliver the latest research activities in mathematics and mathematical sciences but also constitute valuable and incomparable collections of articles that pass down history of progress of mathematics and mathematical science in Japan.

Articles in Kôkyûroku are available on the websites of RIMS and Kyoto University Research Information Repository. They are very frequently accessed on the internet, with a total of as many as 1,380,032 accesses in 2017.

The authors choose the languages to write articles, and many are written in Japanese, which is one of the characteristics of Kôkyûroku. As a result, Kôkyûroku is regarded as a significant and important literature which allows easy access to the latest specialized knowledge in the large fields of mathematics and mathematical sciences written in native language for Japanese readers, while more and more research papers are being written in English in recent years.

We are deeply grateful to many of those who have participated in cooperative research activities of RIMS and greatly developed Kôkyûroku. We heartily ask for your continuous participation in research activities at RIMS as an International Joint Usage/Research Center(*) and your warm support and cooperation for the fruitful development of Kôkyûroku.

* RIMS was certified as an International Joint Usage/Research Center on Nov. 13, 2018.

RIMS Kôkyûroku 2186

*Recent developments on inverse problems for
partial differential equations and their applications*

January 6 ~ 8, 2021

edited by Takashi Ohe

June, 2021

Research Institute for Mathematical Sciences

Kyoto University, Kyoto, Japan

This is a report of research done at the Research Institute for Mathematical Sciences,
an International Joint Usage/Research Center located in Kyoto University.
The papers contained herein are in final form and will not be submitted for publication elsewhere.

Preface

This volume is the proceedings of the RIMS open workshop on “Recent developments on inverse problems for partial differential equations and their applications”, which was held on January 6th-8th, 2021. The workshop aims to exchange information on recent researches on inverse problems for partial differential equations and to expand collaborative studies between mathematical sciences and other research fields. Unfortunately, the workshop was held online via Zoom because of the COVID-19 pandemic worldwide. Instead of such a severe situation, 17 fantastic lectures were presented including 3 lectures by foreign researchers. Also, many participants from worldwide area watched the lectures at their living place. It is our great honours that participants of this workshop exchange their ideas, and make fruitful collaborations.

We would like to thank all speakers and participants of the workshop for their interesting lectures and fruitful discussions. We also thank the staffs of RIMS for their kind help and support.

The COVID-19 pandemic is still in a severe stage all over the world. We hope this pandemic will end near future, and that we can discuss together face to face.

May 2021,
Takashi Ohe
On behalf of the organizing committee

Program of the workshop

January 6th, 2021 (Wed.)

10:00 -- 10:50 Koya Sakakibara (Okayama University of Science)

Numerical analysis of constrained total variation flows and its application to the Kobayashi-Warren-Carter model

11:00 -- 12:00 Xuefeng Liu (Niigata University)

Pointwise error estimation and high-precision resistance measurement with four-probe method

13:30 -- 14:20 Daiki Shiozawa (Kobe University)

Three-dimensional reconstruction of leaked gas cloud based on computed tomography processing of infrared measurement data

14:30 -- 15:20 Tomoya Takeuchi (University of Tokyo)

Numerical homogenization of dual-phase steel by nonlinear conjugate gradient method

15:40 -- 16:30 Lorenzo Cavallina (Tohoku University)

On an overdetermined problem for composite materials

January 7th, 2021 (Thu.)

9:10 -- 10:10 Alexandru Tamasan (University of Central Florida)

Range characterization of the X_{ray} transform on the Fourier Lattice

10:20--11:20 Jenn-Nan Wang (National Taiwan University)

Non-radiating sources for the elastic waves in anisotropic inhomogeneous media

11:30--12:20 Hiroyuki Kudo (University of Tsukuba)

Mathematics of image reconstruction in sparse-view CT and interior CT

13:40--14:30 Mizuka Komatsu (Kobe University)

An algebraic approach to challenges on identification problems in systems biology

14:40--15:30 Ipei Obayashi (RIKEN AIP)

Inverse problems on persistence diagrams

15:50--16:40 Tsutomu Matsuura and Saburo Saitoh (Gunma University)

Inverse problems and theory of reproducing kernels --- theory and numerical experiments ---

January 8th, 2021 (Fri.)

9:10-10:10 Makoto Miura (University of Tokyo)

Reconstruction problems in algebraic vision

10:20-11:10 Kenjiro Kimura (Kobe University)

Development of multi-static scattering field inverse analysis theory and next-generation breast cancer diagnostic imaging technology

11:20-12:10 Jin Cheng (Fudan University)

A linear nonlocal model for outbreak of COVID-19 and parameter identification

13:30-14:20 Takashi Furuya (Nagoya University)

The monotonicity method for the inverse crack scattering problem

14:30-15:20 Ryusei Yamashita (Tokyo Metropolitan University)

Reconstruction of the defect by the enclosure method for inverse problems of the magnetic Schrödinger operator

15:40-16:30 Toshiaki Yachimura (Kyoto University)

On an inverse Robin eigenvalue problem appearing in thin coating problems

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RIMS 共同研究 (公開型) 報告集

2021 年 1 月 6 日~1 月 8 日
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