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Microlocal Analysis and Singular Perturbation Theory

edited by Yoshitsugu Takei, Takashi Aoki,
Naofumi Honda, Kiyoomi Kataoka and Tatsuya Koike

January, 2017
Research Institute for Mathematical Sciences
Kyoto University

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Microlocal Analysis and Singular Perturbation Theory

October 5～9, 2015

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Preface

This volume of RIMS Kôkyûroku Bessatsu is the Proceedings of the RIMS Conference

"Microlocal Analysis and Singular Perturbation Theory"

held at the Research Institute for Mathematical Sciences, Kyoto University from October 5 (Monday) through October 9 (Friday) in 2015. The volume contains research papers, announcements and survey articles contributed by invited speakers of the above conference. All papers in the volume have been reviewed and are in their final forms.

The conference was planned to celebrate the eightieth birthday of Professor Hikosaburo Komatsu and the seventieth birthday of Professor Takahiro Kawai. As everyone in the fields knows, Prof. Komatsu and Prof. Kawai have made great contributions to the developments of algebraic analysis, microlocal analysis and singular perturbation theory. We are most obliged to them for all their activities and achievements in these fields. Taking this opportunity, we would like to express our sincerest gratitude to Prof. Komatsu and Prof. Kawai and at the same time we are very pleased to see that they are still very active and enjoying mathematics.

The conference was supported by RIMS. We express our heartiest thanks to the secretary staff of RIMS for their kind assistance.

Kyoto in October, 2016

Yoshitsugu Takei
(Editor in chief)
Takashi Aoki
Naofumi Honda
Kiyoomi Kataoka
Tatsuya Koike

Program

Microlocal Analysis and Singular Perturbation Theory

October 5 (Mon) – October 9 (Fri), 2015
Lecture Hall (Room No. 420) of RIMS, Kyoto University

October 5, Monday

13:00 – 13:50 Pierre Schapira (Paris, France)
Grothendieck topologies for analysis

14:00 – 14:50 Kiyoomi Kataoka (Univ. of Tokyo)
The functor $\beta_Y(\cdot)$ and mixed problems for $\mathscr{D}_X$-modules

15:10 – 16:00 Masafumi Yoshino (Hiroshima Univ.)
Monodromy of some resonant Hamiltonian system

16:10 – 17:00 Shinji Sasaki (RIMS, Kyoto Univ.)
Bifurcation phenomenon of Stokes curves around a double turning point and influence of virtual turning points upon nonadiabatic transition probabilities

October 6, Tuesday

10:00 – 10:50 Setsuro Fujiie (Ritsumeikan Univ.)
Resonances near an energy-level crossing

11:10 – 12:00 Johannes Sjöstrand (Bourgogne, France)
Non-self-adjoint perturbations of completely integrable Hamiltonians in 2D — rational tori and spectral centipedes
(joint work with Michael Hitrik)

14:00 – 14:50 Reinhard Schäfke (Strasbourg, France)
Factorisation of fundamental WKB-solutions
(joint work with Charlotte Hulek)

15:10 – 16:00 Keisuke Uchikoshi (National Defense Academy)
On gravity water waves

16:10 – 17:00 Takahiro Kawai (RIMS, Kyoto Univ.) and
Naofumi Honda (Hokkaido Univ.)
An invitation to Sato's postulates in micro-analytic S-matrix theory

October 7, Wednesday

10:00 – 10:50 Ovidiu Costin (Ohio State, USA)
Exact WKB and resurgence

11:10 – 12:00 Masaki Kashiwara (RIMS, Kyoto Univ.)
Riemann-Hilbert problem of irregular holonomic $\mathscr{D}$-modules

October 8, Thursday

10:00 – 10:50 Yuichi Ike (Univ. of Tokyo)
Hyperbolic localization and Lefschetz fixed point formulas for higher-dimensional fixed point sets

11:10 – 12:00 Yves Laurent (Grenoble, France)
b-functions and regular holonomic D-modules

14:00 – 14:50 Toshio Oshima (Josai Univ.)
Linear ordinary differential equations in the complex domain and hypergeometric systems

15:10 – 16:00 Toshinori Oaku (Tokyo Woman's Christian Univ.)
Some algorithmic problems for holonomic distributions

16:10 – 17:00 Hikosaburo Komatsu (Univ. of Tokyo)
History of mathematics of the world due to D.E. Smith

October 9, Friday

10:00 – 10:50 Tatsuya Koike (Kobe Univ.)
A remark on the growth order of Borel transform of WKB solutions of one-dimensional Schrödinger equations — Toward a proof of its multisummability

11:10 – 12:00 David Sauzin (Pisa, Italy & CNRS, France)
Nonlinear analysis with endlessly continuable functions
(joint work with Shingo Kamimoto)

14:00 – 14:50 Kohei Iwaki (Nagoya Univ.)
Topological recursion, quantum curves and Painlevé equations

15:10 – 16:00 Takashi Aoki (Kinki Univ.)
The hypergeometric function and WKB solutions

16:10 – 17:00 Yoshitsugu Takei (RIMS, Kyoto Univ.)
On the exact WKB analysis of discrete Painlevé equations

List of Participants

Masayuki Akamatsu	Japan Coast Guard Academy
Takashi Aoki	Kinki University
Yasuo Chiba	Tokyo University of Technology
Ovidiu Costin	Ohio State University
Setsuro Fujiié	Ritsumeikan University
Keiko Fujita	Toyama University
Takahiro Hatano	The University of Tokyo
Sampei Hirose	Shibaura Institute of Technology
Naofumi Honda	Hokkaido University
Kunio Ichinobe	Aichi University of Education
Yuichi Ike	The University of Tokyo
Hiroyuki Inou	Kyoto University
Ryuichi Ishimura	Chiba University
Hidekazu Ito	Kanazawa University
Kohei Iwaki	Nagoya University
Shingo Kamimoto	Hiroshima University
Masaki Kashiwara	RIMS, Kyoto University
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Yasunori Okada	Chiba University
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Reinhard Schäfke	Université de Strasbourg
Pierre Schapira	Université de Paris VI
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Junji Suzuki	Shizuoka University
Hidetoshi Tahara	Sophia University
Shinichi Tajima	The University of Tsukuba
Toshinori Takahashi	Kinki University
Yoshitsugu Takei	RIMS, Kyoto University

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Mika Tanda	Kwansei Gakuin University
Motoo Uchida	Osaka University
Keisuke Uchikoshi	National Defense Academy
Koichi Uchiyama	Sophia University
Takato Uehara	Saga University
Kohei Umeta	Hokkaido University
Yoko Umeta	Yamaguchi University
Ryoko Wada	Hiroshima Shudo University
Seiichiro Wakabayashi	The University of Tsukuba
Takuya Watanabe	Ritsumeikan University
Hideshi Yamane	Kwansei Gakuin University
Susumu Yamazaki	Nihon University
Hiroshi Yamazawa	Shibaura Institute of Technology
Masafumi Yoshino	Hiroshima University
Noriaki Yoshino	Tokyo University of Science

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