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**New development of microlocal analysis  
and singular perturbation theory**

edited by Naofumi Honda and Yasunori Okada

June, 2019

Research Institute for Mathematical Sciences  
Kyoto University

*RIMS Kôkyûroku Bessatsu B75*

*New development of microlocal analysis  
and singular perturbation theory*

*October 3 ~7, 2016*

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*Research Institute for Mathematical Sciences*

*Kyoto University, Kyoto, Japan*

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## PREFACE

This volume presents a collection of research and survey articles which were contributed by invited speakers in the RIMS workshop “ New development of microlocal analysis and singular perturbation theory ” held at Research Institute for Mathematical Sciences (RIMS), Kyoto University from 3 through 7 October, 2016, in which experts from many areas of mathematics participated.

NAOFUMI HONDA  
YASUNORI OKADA

# PROGRAM

RIMS Workshop on

## **New development of microlocal analysis and singular perturbation theory**

Organizers: NAOFUMI HONDA (Hokkaido Univ.) and YASUNORI OKADA (Chiba Univ.).

October 3 (Mon.)–7 (Fri.), 2016, Room No. 111 of RIMS, Kyoto University

### **October 3, Monday**

- 10:00 - 10:50 Joe Kamimoto (Kyushu University)  
On analytic continuation of local zeta functions
- 11:10 - 12:00 Saiei-Jaeyeong Matsubara-Heo (University of Tokyo)  
On the rapid decay homology of F.Pham
- 13:30 - 14:20 Yasunori Okada (Chiba University)  
A continuation method for coupling transforms (joint work with R. Schäfke and H. Tahara)
- 14:35 - 15:10 Daichi Komori (Hokkaido University)  
Intuitive representation of a local cohomology group
- 15:20 - 15:55 Kohei Umeta (Hokkaido University)  
A vanishing theorem of global cohomology groups with values in the sheaf of Whitney jets with Gevrey conditions (joint work with N. Honda and T. Simoyama)
- 16:10 - 17:00 Kiyoomi Kataoka (University of Tokyo)  
Sobolev forms for microfunctions with real analytic parameters and the microlocal energy method

### **October 4, Tuesday**

- 10:00 - 10:50 Hideshi Yamane (Kwansei Gakuin University)  
Asymptotics for the focusing integrable discrete nonlinear Schrödinger equation
- 11:10 - 12:00 Naoto Kumano-go (Kogakuin University)  
Phase space path integral of higher order parabolic type with general functional as integrand
- 13:40 - 14:30 Toshinori Oaku (Tokyo Woman's Christian University)  
An algorithmic study on the integration of holonomic distributions

14:50 - 15:40 Yutaka Matsui (Kindai University)  
Topological Radon transforms and their applications

16:00 - 16:50 Shinichi Tajima (University of Tsukuba)  
Local cohomology solutions of holonomic D-modules associated with non-isolated hypersurface singularities

### October 5, Wednesday

10:00 - 10:50 Katsuyoshi Ohara (Kanazawa University)  
Comprehensive Groebner systems in Poincare-Birkhoff-Witt algebra and Bernstein-Sato ideals (joint work with K. Nabeshima and S. Tajima)

11:10 - 12:00 Hiroshi Yamazawa (Shibaura Institute of Technology)  
Singular solutions of the Briot-Bouquet type equations  
—partial differential equation and  $q$ -difference-differential equation—

13:40 - 14:30 Masafumi Yoshino (Hiroshima University)  
Moving singularity and monodromy of Hamiltonian system containing generalized Emden-Fowler equation

14:50 - 15:40 Yoko Umeta (Yamaguchi University)  
Stokes geometry for a unified family of some Painlevé hierarchies

16:00 - 16:50 Hidetoshi Tahara (Sophia University)  
On the summability of formal solutions of some linear  $q$ -difference partial differential equations

### October 6, Thursday

10:00 - 10:35 Toshinori Takahashi (Kindai University)  
Exact WKB analysis and Jacobi polynomials with varying nonstandard parameters (joint work with T. Aoki and M. Tanda)

11:00 - 11:50 Takashi Aoki (Kindai University)  
The hypergeometric function, confluent hypergeometric functions and WKB solutions (joint work with T. Takahashi and M. Tanda)

13:40 - 14:30 Naofumi Honda (Hokkaido University) and Takahiro Kawai (RIMS)  
A unified treatment of pinch points and cusps in Landau-Nakanishi surfaces with microlocal analysis

14:50 - 15:40 Sampei Hirose (Shibaura Institute of Technology)  
On non-hereditary turning points; particular turning points which appear in the deformation theory of ordinary differential equations

16:00 - 16:50 Sampei Hirose, Takahiro Kawai (RIMS) and Yoshitsugu Takei (RIMS)  
On some recent results in the theory of virtual turning points

**October 7, Friday**

10:30 - 11:05 Takahiro Shigaki (Kobe University)  
Nonlinear eigenvalue problems and exact WKB analysis

11:25 - 12:00 Kenji Kurogi (Hiroshima University)  
Counterexample to the summability of the formal solution of some PDE

13:40 - 14:30 Yasuyuki Hatsuda (University of Geneva)  
Quantization Conditions in Difference Equations

14:50 - 15:40 Kohei Iwaki (Nagoya University)  
Exact WKB analysis vs spectral networks

16:00 - 16:50 Eric Delabaere (Université d'Angers)  
Several topics about resurgence theory

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