Preface

This volume collects thirteen selected research papers contributed by the speakers of the RIMS workshop “Potential Theory and its Related Fields”. All papers have been refereed and are in final form.

The workshop was held at Kyoto University from 3 to 7 September, 2012, and was organized by Hiroaki Aikawa (Hokkaido University), Kentaro Hirata (Hiroshima University), Jun Kigami (Kyoto University) and Masaharu Nishio (Osaka City University). The aim was to overview recent developments in potential theory and its related fields. There were 32 invited and contributed lectures and 70 participants during the meeting.

I would liked to express my sincere gratitude to all the participants, particularly the speakers, and anonymous referees for their cooperation.

Hiroshima, July 2013

Kentaro Hirata
RIMS workshop
Potential Theory and its Related Fields

Dates: September 3 – 7, 2012
Venue: Research Building No. 8 Lecture Room 2,
Faculty of Engineering, Kyoto University
Organizers: Kentaro Hirata (Akita, Chair), Hiroaki Aikawa (Sapporo),
Jun Kigami (Kyoto), Masaharu Nishio (Osaka)

Program

Monday, September 3

10:00 – 10:15 Opening
10:15 – 11:15 John Lewis
\(p\) harmonic measure in simply connected domains revisited
11:30 – 12:30 Atsushi Kasue
Quasi-monomorphisms and \(p\)-harmonic functions with finite Dirichlet sum
14:00 – 15:00 Nageswari Shanmugalingam
Constructing a prime end boundary for non-simply connected domains in Euclidean
spaces and metric measure spaces
15:15 – 15:45 Vadim Kaimanovich
Electrical network reduction and the finite Dirichlet problem
15:55 – 16:25 Hiroaki Masaoka
On harmonic Hardy-Orlicz spaces
16:40 – 17:10 Ryozi Sakai
A characterization of entire functions and approximation
17:20 – 17:50 Yûsuke Okuyama
Equilibrium measures for uniformly quasiregular dynamics
Tuesday, September 4

9:15 – 10:15  **Masanori Hino**  
Geodesic distances and intrinsic distances on some fractal sets

10:30 – 11:30  **Laurent Saloff-Coste**  
Heat kernel estimates on inner uniform domains

11:45 – 12:45  **Kazumasa Kuwada**  
Applications of Hopf-Lax formulae to analysis of heat distributions

14:00 – 15:00  **Anders Björn**  
The Perron method for \( p \)-harmonic functions: Resolutivity and invariance results

15:15 – 15:45  **Tsubasa Itoh**  
Modulus of continuity of \( p \)-Dirichlet solutions in a metric measure space

15:55 – 16:25  **Yoshihiro Mizuta**  
Sobolev’s inequality for Riesz potentials in Lorentz spaces of variable exponent

16:40 – 17:10  **Tanran Zhang**  
A potential theoretic approach to the curvature equation

17:20 – 17:50  **Sachiko Hamano**  
Variation for the metrics induced by Schiffer and harmonic spans

Wednesday, September 5

9:15 – 10:15  **Eleutherius Symeonidis**  
A concept of harmonicity for families of planar curves

10:30 – 11:30  **Tomas Sjödin**  
Two-phase quadrature domains and harmonic balls

Thursday, September 6

9:15 – 10:15  **John Mackay**  
The quasisymmetric geometry of boundaries of relatively hyperbolic groups

10:30 – 11:30  **Bruce Kleiner**  
Asymptotic geometry, harmonic functions, and finite generation of isometry groups

11:45 – 12:45  **Eero Saksman**  
Rotation of planar quasiconformal maps

14:00 – 15:00  **Mario Bonk**  
Non-linear potential theory and the Rickman-Picard theorem
15:15 – 15:45  Naotaka Kajino  
Weyl’s Laplacian eigenvalue asymptotics for the measurable Riemannian structure on the Sierpiński gasket

15:55 – 16:25  Tetsu Shimomura  
Hardy averaging operator on generalized Banach function spaces

16:40 – 17:10  Kiyoki Tanaka  
A representation for harmonic Bergman function and its application

17:20 – 17:50  Fumi-Yuki Maeda  
Mean continuity for potentials of functions in Musielak-Orlicz spaces

Friday, September 7

9:15 – 10:15  Jeremy Tyson  
Distortion of dimension by projections and Sobolev mappings

10:30 – 11:30  Yoshihiro Sawano  
Morrey spaces and fractional integral operators

11:45 – 12:45  Thomas Ransford  
Computation of capacities

14:00 – 15:00  Tom Carroll  
Isoperimetric inequalities for a Sobolev Constant

15:15 – 15:45  Minoru Yanagishita  
The first boundary value problem of the biharmonic equation for the half-space

15:55 – 16:25  Hiroaki Aikawa  
Extended Harnack inequalities with exceptional sets and a boundary Harnack principle

16:35 – 17:05  Kentaro Hirata  
Heat kernel estimates and growth estimates of solutions of semilinear heat equations

17:10 – 17:20  Closing

This workshop is supported by Research Institute for Mathematical Sciences, Kyoto University and the following JSPS Grant-in-Aid for Scientific Research:

(A) #20244007 (Principal researcher: Hiroaki Aikawa, Hokkaido University),
(B) #23340025 (Principal researcher: Jun Kigami, Kyoto University),
(C) #23540220 (Principal researcher: Masaharu Nishio, Osaka City University).
Contents

Tom Carroll and Jesse Ratzkin .................................................. 1
An isoperimetric inequality for extremal Sobolev functions

Sachiko Hamano ................................................................. 17
Schiffer functions on domains in $\mathbb{C}^n$

Kentaro Hirata ................................................................. 29
Two sided global estimates of heat kernels in Lipschitz domains

Tero Kilpeläinen, Pekka Koskela and Hiroaki Masaoka ................. 47
Examples of harmonic Hardy-Orlicz spaces on the plane with finitely many punctures

Kazumasa Kuwada .............................................................. 61
Gradient estimate for Markov kernels, Wasserstein control and Hopf-Lax formula

Fumi-Yuki Maeda, Yoshihiro Mizuta, Takao Ohno and Tetsu Shimomura 81
Mean continuity for potentials of functions in Musielak-Orlicz spaces

Yoshihiro Mizuta and Takao Ohno ......................................... 101
Sobolev’s inequality for Riesz potentials in central Lorentz-Morrey spaces of variable exponent

Yûsuke Okuyama and Pekka Pankka ...................................... 121
Accumulation of periodic points for local uniformly quasiregular mappings

Ryozi Sakai and Noriaki Suzuki ........................................... 141
A characterization of real entire functions by polynomial approximation for exponential weights

Yoshihiro Sawano, Satoko Sugano and Hitoshi Tanaka .................. 155
A bilinear estimate for commutators of fractional integral operators

Eleutherius Symeonidis ....................................................... 171
Harmonic families of planar curves
Kiyoki Tanaka ................................................................. 183

Interpolation theorem for harmonic Bergman functions

Naohiro Yaginuma and Minoru Yanagishita ......................... 193

On the Dirichlet problem of the biharmonic equation for the half-space