

April 13, 2025

# RYOSUKE SHIMIZU

Graduate School of Informatics, Kyoto University

Email: r.shimizu@acs.i.kyoto-u.ac.jp (or ryosuke.shimizu.math@gmail.com)

## Employment

Assistant Professor, Graduate School of Informatics, Kyoto University	Apr. 2025—Present
Junior Researcher (Assistant Professor) · JSPS Research Fellow PD, Waseda Research Institute for Science and Engineering, Waseda University	Oct. 2023—Mar. 2025

## Education

Ph.D. in Informatics, Kyoto University. (Supervisor: Jun Kigami)	Apr. 2020—Sep. 2022
MInf, Kyoto University. (Supervisor: Jun Kigami)	Apr. 2018—Mar. 2020
B.Sc., Faculty of Science, Kyoto University.	Apr. 2014—Mar. 2018

## Award

MSJ Takebe Katahiro Prize for Encouragement of Young Researchers 2024	Sep. 2024
---	-----------

## Publications and Preprints

- *Construction of self-similar energy forms and singularity of Sobolev spaces on self-similar Laakso-type spaces* (with Riku Anttila and Sylvester Eriksson-Bique), preprint (2025).
- *Characterizations of Sobolev functions via Besov-type energy functionals in fractals*, preprint (2024); submitted.
- *Finite dimensionality of Besov spaces and potential-theoretic decomposition of metric spaces* (with Takashi Kumagai and Nageswari Shanmugalingam), preprint (2024); submitted.
- *Korevaar–Schoen  $p$ -energy form and associated  $p$ -energy measures on fractals* (with Naotaka Kajino), *Springer Tohoku Series in Mathematics* (to appear).
- *Contraction properties and differentiability of  $p$ -energy forms with applications to nonlinear potential theory on self-similar sets* (with Naotaka Kajino), preprint (2025); submitted.
- *$p$ -Energy forms on fractals: recent progress* (with Naotaka Kajino), preprint (2023); submitted.
- *First-order Sobolev spaces, self-similar energies and energy measures on the Sierpiński carpet\** (with Mathav Murugan), *Comm. Pure Appl. Math.* (in press).
- *Construction of  $p$ -energy and associated energy measures on Sierpiński carpets*, *Trans. Amer. Math. Soc.* **377** (2024), no.2, 951–1032.
- *Parabolic index of an infinite graph and Ahlfors regular conformal dimension of a self-similar set*; in *Analysis and Partial Differential Equations on Manifolds, Fractals and Graphs*, edited by Alexander Grigor'yan and Yuhua Sun, Berlin, Boston: De Gruyter, 2021, pp. 201–274.

---

\*A detailed version of this paper is available at arXiv:2308.06232v3 (long version). Several statements and proofs have been removed from the detailed version.

## Selected Talks

---

- *Self-similar  $p$ -energy form and  $p$ -energy measures on the Sierpinski carpet*, The 3rd Hong Kong/Kyoto Workshop on Fractal Geometry and Related Areas, The Chinese University of Hong Kong, Hong Kong, March 22, 2025.
- *On singularity of  $p$ -energy measures among distinct values of  $p$  for some  $p$ -c.f. self-similar sets*, Geometric Analysis Seminar, University of Jyväskylä, Jyväskylä, Finland, October 2, 2024.
- *Construction of Korevaar–Schoen  $p$ -energy forms and associated  $p$ -energy measures* (short presentation), Recent Developments in Dirichlet Form Theory and Related Fields, Oberwolfach, Germany, September 17, 2024.
- *First-order Sobolev spaces and self-similar energies on the Sierpinski carpet*, Geometric Analysis Seminar, University of Jyväskylä, Jyväskylä, Finland, March 11, 2024.
- *Construction of a canonical  $p$ -energy on the Sierpiński carpet for all  $p > 1$* , Geometric and Stochastic analysis on metric spaces, Kyoto University, Kyoto, Japan, March 13, 2023.
- *Nonlinear potential theory on the Sierpiński carpet* (25 minutes talk), Analysis and geometry of fractals and metric spaces: Recent developments and future prospects, Bankoku Shinryokan, Okinawa, Japan, March 9, 2023.
- *Construction of a canonical  $p$ -energy on the Sierpiński carpet* (short talk), Smooth Functions on Rough Spaces and Fractals with Connections to Curvature Functional Inequalities, Banff International Research Station, Banff, Canada, November 24, 2022.
- *Construction of a canonical  $p$ -energy on the Sierpiński carpet*, Quasiworld, UCLA (zoom), October 20, 2021.
- *Generalized resistance metrics on graphs* (30 minutes talk), Kobe Workshop on Probabilistic Potential Theory and Related Fields, Kobe, Japan, May 7, 2019.

## Fellowship

---

JSPS Research Fellow (PD) for Young Scientists, Waseda University	Apr. 2023—Apr. 2025
JSPS Research Fellow (PD) for Young Scientists <sup>*</sup> , Kyoto University	Sep. 2022—Mar. 2023
JSPS Research Fellow (DC1) for Young Scientists, Kyoto University	April 2020—Sep. 2022

## Grant

---

JSPS, Grant-in-Aid for JSPS Fellows, 23KJ2011	Apr. 2023—Mar. 2026
JSPS, Grant-in-Aid for JSPS Fellows, 20J20207	Apr. 2020—Mar. 2023

---

<sup>\*</sup>The category was changed from (DC1) because I obtained the doctoral degree.