

## *Unit Name*

Geometric Partial Differential Equations Unit

## *Research Personnel*

Daowen Lin, Postdoctoral Scholar

Tapio Kurkinen, Postdoctoral Scholar

Erbol Zhanpeisov, Postdoctoral Scholar (Currently JSPS Postdoctoral Fellow, Tohoku University)

Made Benny Prasetya Wiranata, OIST Student

## *Scholarly Contributions and Creative Productions (by Faculty)*

### *Conference Proceedings*

1. Kagaya, T.; Liu, Q.; Mitake, H.  
Quasiconvexity Preserving Property for First Order Nonlocal Evolution Equations. In RIMS Kokyuroku; RIMS, Kyoto University, 2024; Vol. 2277, pp 57–69.

### *Journal Article*

1. Liu, Q.; Shanmugalingam, N.; Zhou, X.  
Discontinuous Eikonal Equations in Metric Measure Spaces. Transactions of the American Mathematical Society 2025, 378, 695–729.
2. Liu, Q.; Zhanpeisov, E.  
Liouville-Type Theorems for Fully Nonlinear Elliptic and Parabolic Equations with Boundary Degeneracy. Journal of Differential Equations 2025, 427.
3. Dragoni, F.; Liu, Q.; Zhang, Y.  
Horizontal Semiconcavity for the Square of Carnot-Carathéodory Distance on Step 2 Carnot Groups and Applications to Hamilton-Jacobi Equations. Nonlinearity 2025, 38.
4. Kagaya, T.; Liu, Q.; Mitake, H.  
A Representation Formula for Viscosity Solutions of Nonlocal Hamilton-Jacobi Equations and Applications. SIAM Journal on Mathematical Analysis 2024, 56, 5807–5839.
5. Kijowski, A.; Liu, Q.; Zhou, X.  
Horizontally Quasiconvex Envelope in the Heisenberg Group. Revista Matematica Iberoamericana 2024, 40, 57–92.

### *Presentation at Conference*

1. Liu, Q.  
Uniqueness of Solutions to Nonlinear Parabolic Equations in Unbounded Spacetime Domains. Workshop on Elliptic & Parabolic PDEs 2024 2024.
2. Liu, Q.  
Monge Solutions of Hamilton-Jacobi Equations. Workshop on Homogenization in PDE and Stochastic Processes 2024.
3. Liu, Q.

A PDE-Based Approach to Borell-Brascamp-Lieb Inequality. Kumamoto University Applied Analysis Seminar 2024.

4. Liu, Q.

A PDE-Based Approach to Borell-Brascamp-Lieb Inequality. UMass Analysis and PDE Seminar 2024.

5. Liu, Q.

Hamilton-Jacobi Equations on Metric Spaces. Multidisciplinary Study in Math 2024.

6. Liu, Q.

Monge Solutions of Eikonal Equations in Metric Spaces. Invited talk at 2024 Spring Meeting of the Mathematical Society of Japan 2024.

7. Liu, Q.

A PDE-Based Approach to Borell-Brascamp-Lieb Inequality. Fukae nonlinear PDE conference 2024.

### **Scholarly Contributions (by Unit Members)**

Name of Unit Member	Type	Title	Outlet	Year Pub
Erbol Zhanpeisov	Journal Article	Existence of solutions for time fractional semilinear parabolic equations in Besov–Morrey spaces	Journal of Evolution Equations	2024
Erbol Zhanpeisov	Poster Presentation at Conference	Liouville-type theorems for fully nonlinear elliptic and parabolic equations with boundary degeneracy	Swansea Summer School in Nonlinear PDEs, Swansea University	2024
Daowen Lin	Presentation at Conference	Liouville type theorem for a class quasilinear p-Laplace equation on the sphere	Mathematical Society of Japan Spring Meeting 2025, Waseda University	2025
Erbol Zhanpeisov	Presentation at Conference	Liouville-type theorems for fully nonlinear elliptic and parabolic equations with boundary degeneracy	Tohoku University Seminar on Applied Mathematical Analysis, Tohoku University	2024
Tapio Kurkinen	Presentation at Conference	Harnack’s inequalities for a nonlinear parabolic equation in non-divergence form	Mathematical Society of Japan Spring Meeting 2025, Waseda University	2025
Erbol Zhanpeisov	Presentation at Conference	Liouville-type theorems for fully nonlinear elliptic and parabolic equations with boundary degeneracy	The 45th Young Researchers' Seminar on Evolution Equations, Kokuminshukusha Shingu-so	2024
Erbol Zhanpeisov	Presentation at Conference	Liouville-type theorems for fully nonlinear elliptic and parabolic equations with boundary degeneracy	Muroran Institute of Technology Applied Analysis Seminar, Muroran Institute of Technology	2025
Erbol Zhanpeisov	Presentation at Conference	Liouville-type theorems for fully nonlinear elliptic and parabolic equations with boundary degeneracy	The 1st Workshop on Viscosity Solutions, Optimal Control, and Mathematical Finance, Waseda University	2025
Erbol Zhanpeisov	Presentation at Conference	Liouville-type theorems for fully nonlinear elliptic and parabolic equations with boundary degeneracy	PDE Reading Seminar, University of Wisconsin-Madison, online	2024

Name of Unit Member	Type	Title	Outlet	Year Pub
Erbol Zhanpeisov	Presentation at Conference	Liouville-type theorems for fully nonlinear elliptic and parabolic equations with boundary degeneracy	Mathematical Society of Japan Autumn Meeting 2024, Osaka University	2024

### ***Honors, Awards & Fellowships***

2022-12-24 - Ongoing      14th Hukuhara Prize, 第十四回福原賞, 2022, Division of Functional Equations, the Mathematical Society of Japan

### ***Workshops and Seminars (Organized and Hosted by Faculty/Units)***

Speaker Name(s)	Title	Location	Date
Claudio Marchi (University of Padova)	First order mean field games on networks	OIST Geometric PDE and Applied Analysis Seminar	2025-03-06
Luca Capogna (Smith College)	Short time existence for curve shortening flows in Carnot groups	2025 OIST Conference Sub-Riemannian Analysis and Geometry	2025-01-16
Enrico Le Donne (University of Fribourg)	Variational curve flows in Carnot groups	2025 OIST Conference Sub-Riemannian Analysis and Geometry	2025-01-16
Xiao Zhong (University of Helsinki)	Dimer models and Beltrami equation	2025 OIST Conference Sub-Riemannian Analysis and Geometry	2025-01-15
Luca Rizzi (SISSA)	Measure contraction properties for sub-Riemannian structures beyond step 2	2025 OIST Conference Sub-Riemannian Analysis and Geometry	2025-01-15
Kenshiro Tashiro (OIST)	RCD condition for spaces with sub-Riemannian type singularities	2025 OIST Conference Sub-Riemannian Analysis and Geometry	2025-01-15
Giovanna Citti (University of Bologna)	A representation formula on the characteristic plane of the Heisenberg group	2025 OIST Conference Sub-Riemannian Analysis and Geometry	2025-01-15
Bianca Stroffolini (University of Naples Federico II)	Natural p-means for the p-Laplacian in the Euclidean space and in the Heisenberg group	2025 OIST Conference Sub-Riemannian Analysis and Geometry	2025-01-15
Ye Zhang (OIST)	The heat flow approach to the Prékopa--Leindler inequality	2025 OIST Conference Sub-Riemannian Analysis and Geometry	2025-01-14
Maria Gordina (University of Connecticut)	Dimension-independent functional inequalities on sub-Riemannian manifolds	2025 OIST Conference Sub-Riemannian Analysis and Geometry	2025-01-14
Kotaro Hisa (University of Tokyo)	Existence of solutions semilinear parabolic equations with singular initial data in the Heisenberg group	2025 OIST Conference Sub-Riemannian Analysis and Geometry	2025-01-14
Jeremy Tyson (University of Illinois Urbana-Champaign)	The H-type deviation of a step two Carnot group	2025 OIST Conference Sub-Riemannian Analysis and Geometry	2025-01-14

Speaker Name(s)	Title	Location	Date
Davide Barilari (University of Padova)	Refined Strichartz Estimates for sub-Laplacians in Heisenberg and H-type groups	2025 OIST Conference Sub-Riemannian Analysis and Geometry	2025-01-14
Andrea Pinamonti (University of Trento)	Some regularity results for balance laws and applications to the Heisenberg group	2025 OIST Conference Sub-Riemannian Analysis and Geometry	2025-01-14
Yoshikazu Giga (University of Tokyo)	On a sharp interface limit of the Kobayashi-Warren-Carter system	OIST Geometric PDE and Applied Analysis Seminar	2024-12-06
Ki-Ahm Lee (Seoul National University)	Degenerate nonlinear partial differential equations in curvature flows	OIST Geometric PDE and Applied Analysis Seminar	2024-11-20
Takashi Kagaya (Muroran Institute of Technology)	Sharp interface limit for a large deviation rate function	OIST Geometric PDE and Applied Analysis Seminar	2024-10-24
Jun-ichi Segata (Kyushu University)	Scattering problem for the generalized Korteweg-de Vries equation	OIST Geometric PDE and Applied Analysis Seminar	2024-10-24
Tatsuya Miura (Kyoto University)	Variational stabilization of degenerate p-elasticae	OIST Geometric PDE and Applied Analysis Seminar	2024-09-27
Hiroyoshi Mitake (University of Tokyo)	Quantitative homogenization of state-constraint Hamilton–Jacobi equations on perforated domains and applications	OIST Geometric PDE and Applied Analysis Seminar	2024-09-27
Mitsuru Sugimoto (Nagoya University)	On a global inverse function theorem for homogeneous map and its application	OIST Geometric PDE and Applied Analysis Seminar	2024-09-26
Futoshi Takahashi (Osaka Metropolitan University)	The Hardy inequality on bounded domains for mean zero functions	OIST Geometric PDE and Applied Analysis Seminar	2024-09-26
Shuhei Kitano (Waseda University)	Carderón-Zygmund estimates for fully nonlinear equations	OIST Geometric PDE and Applied Analysis Seminar	2024-08-14
Tatsuki Kawakami (Ryukoku University)	Asymptotic expansions of solutions to fractional diffusion equations	OIST Geometric PDE and Applied Analysis Seminar	2024-06-19
Keisuke Takaso (Kyoto University)	Phase field method for mean curvature flow with obstacles	OIST Geometric PDE and Applied Analysis Seminar	2024-06-19
Masashi Misawa (Kumamoto University)	Regularity for doubly nonlinear parabolic type equations	OIST Geometric PDE and Applied Analysis Seminar	2024-05-29
Yoshiyuki Kagei (Tokyo Institute of Technology)	Eckhaus instability of the compressible Taylor vortices	OIST Geometric PDE and Applied Analysis Seminar	2024-02-09
Ryo Takada (University of Tokyo)	Large time behavior of global solutions to the rotating Navier-Stokes equations	OIST Geometric PDE and Applied Analysis Seminar	2024-02-09
Lorenzo Cavallina (Tohoku University)	A characterization of radial symmetry for composite media by overdetermined level sets	OIST Geometric PDE and Applied Analysis Seminar	2024-02-09
Daniel Hauer (University of Sydney)	Bernstein functional calculus and a generalized Helmholtz problem	OIST Geometric PDE and Applied Analysis Seminar	2024-01-25
Minhyun Kim (Hanyang University)	Robust near-diagonal Green function estimates	OIST Geometric PDE and Applied Analysis Seminar	2024-01-23