

Emergent Research:

The PIMS Postdoctoral Fellow Seminar

Feb 22, 2023 | 9:30am Pacific

Total Variation Flow on metric measure spaces

ABSTRACT:

In this project, we discuss some fine properties and the existence of variational solutions to the Total Variation Flow. Instead of the classical Euclidean setting, we intend to work mostly in the general setting of metric measure spaces.

During the past two decades, a theory of Sobolev functions and BV functions has been developed in this abstract setting. A central motivation for developing such a theory has been the desire to unify the assumptions and methods employed in various specific spaces, such as weighted Euclidean spaces, Riemannian manifolds, Heisenberg groups, graphs, etc.

The Total Variation Flow can be understood as the process of diminishing the total variation using the gradient descent method. This idea can be reformulated using variational solutions, and it gives rise to a definition of parabolic minimizers. The approach's advantages using a minimization formulation include much better convergence and stability properties. This is essential as the solutions naturally lie only in the space of BV functions.

We give an existence proof for variational solutions u associated to the Total Variation Flow. Here, the functions being considered are defined on a metric measure space (X, d, μ) . For such parabolic minimizers that coincide with a time-independent Cauchy Dirichlet datum u_0 on the parabolic boundary of a spacetime-cylinder $\Omega \times (0, T)$ with $\Omega \subset X$ an open set and $T > 0$, we prove the existence in the weak parabolic function space $L^1_{w}(0, T; BV(\Omega))$. This is a joint project with Vito Buffa and Michael Collins.

ABOUT PIMS PDF SEMINARS:

PIMS ongoing lecture series featuring our Postdoctoral Fellows every three weeks. You will have the opportunity to connect with emerging research in the mathematical sciences from a PIMS Postdoctoral Fellow. PIMS PDFs are amongst the top young researchers in Canada, and this is an excellent opportunity to learn about them, and their work.



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Cintia Pacchiano

PIMS PDF, UCalgary

SPEAKER BIO:

Cintia Pacchiano is a PIMS Post-doctoral Fellowship at the University of Calgary under the sponsorship of Prof. Cristian Rios. Her research focuses on Mathematical Analysis, more specifically, in existence and regularity theory for a broad class of partial differential equations. She completed her Ph.D. at Aalto University School of Science, in Finland, where was part of the Nonlinear PDE research group under the supervision of Prof. Juha Kinnunen. During her Ph.D. she discovered the analysis on general metric measure spaces.

For more information and registration:

<https://www.pims.math.ca/seminars/PIMSPDF>