



Fellow	Pankaj Gautam
Host Organisation	NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET
Scientific coordinator	Markus Grasmair



I – SCIENTIFIC ACTIVITY DURING YOUR FELLOWSHIP

1. Worked on a parameter identification problem for a quasilinear parabolic PDE. For the regularised solution of this problem, we introduce a total variation-based regularisation method requiring the solution of a monotone inclusion problem. We show well-posedness in the sense of inverse problems of the resulting regularisation scheme. In addition, we introduce and analyse a numerical algorithm for the solution of this inclusion problem using a nested inertial primal dual method. We demonstrate by means of numerical examples the convergence of both the numerical algorithm and the regularisation method.
2. Worked on Douglas-Rachford dynamical systems to solve monotone inclusion problems on Hadamard Manifold.
3. Initiated a draft on warped Yosida regularization of monotone operators and backward-backward splitting for monotone inclusion problems.
4. Worked on the convergence analysis of the proximal point method for quasi-equilibrium problem (QEP) under sharp minima conditions. We also introduce an inexact proximal point method and demonstrate the convergence of the sequence for solving the QEP. We have also deduced the proximal point approximation for generalized Nash equilibrium problem.

II – PUBLICATION(S) DURING YOUR FELLOWSHIP

1. Pankaj Gautam, V. Vetrivel. "Degenerate preconditioned backward-backward splitting for inclusion problem" (submitted to Optimization).
2. Kanchan Mittal, Pankaj Gautam, V. Vetrivel "Finite Convergence and Sharp Minima for Quasi-Equilibrium Problems" (submitted to Journal of Optimization Theory and its Applications).
3. Pankaj Gautam, Markus Grasmair. "Parameter identification in PDEs by the solution of monotone inclusion problems" (almost final & submit soon).
4. Pankaj Gautam, Ronny Bergmann. "Douglas Rachford dynamical system in Hadamard Manifold" (almost final & submit soon).

III – ATTENDED SEMINARS, WORKHOPS, CONFERENCES

1. Attended a workshop "Constrained Optimization Methods for Models in Data Fusion " at SimulaMet, Oslo, Norway, March 27, 2023.
2. Delivered a talk on "Degenerate preconditioned backward-backward splitting for inclusion problem" at Norwegian Workshop on Mathematical Optimization, Nonlinear and Variational Analysis, NTNU Trondheim, Norway, April 26-28, 2023.
3. Delivered a talk on "Parameterized Douglas-Rachford dynamical systems for generalized DC programming" at 10th International Congress on Industrial and Applied Mathematics, Waseda University, Tokyo, Japan.



4. Delivered a talk on “Tikhonov regularized iterative methods for nonlinear problems” at the 6th European conference on Continuous optimization, Heidelberg University, Germany, September 25-27, 2023.

IV – RESEARCH EXCHANGE PROGRAMME (REP)

Research Exchange Program Location: Mokaplan, INRIA, Paris, France

Date: November 13-17, 2023.

1. Actively engaged with researchers of Mokaplan team at INRIA.
2. Attended the Imaging-in-Paris seminar (<https://imaging-in-paris.github.io/>) at institut Henri Poincaré.
3. Presented a talk “continuous dynamical systems for monotone inclusion and optimization problems” at MokaMeetings, INRIA.
4. Visited to Irène Waldspurger and Antonin Chambolle at applied maths department CEREMADE in Dauphine / PSL university.