

# Application BASTRI

## Fiches Equipes

### MOKAPLAN (SR0716ER)

Avancées en calcul numérique des variations  
MOKAPLAN (SR0553HR) □ MOKAPLAN □ PARMA (SR0955YR)

**Statut:** Décision signée

**Responsable :** Vincent Duval

**Mots-clés de "A - Thèmes de recherche en Sciences du numérique - 2023" :** A5.3. Analyse et traitement d'images , A5.9. Traitement du signal , A6.1.1. Modélisation continue (EDP, EDO) , A6.2.1. Analyse numérique des EDP et des EDO , A6.2.6. Optimisation , A6.3.1. Problèmes inverses , A8.2.3. Calcul des variations , A8.12. Transport optimal , A9. Intelligence artificielle

**Mots-clés de "B - Autres sciences et domaines d'application - 2023" :** B9.5.2. Mathématiques , B9.5.3. Physique , B9.5.4. Chimie , B9.6.3. Economie, finance

**Domaine :** Mathématiques appliquées, calcul et simulation  
**Thème :** Schémas et simulations numériques

**Période :** 01/12/2015 -> 31/12/2026

**Dates d'évaluation :** 15/03/2017 , 12/01/2022

**Etablissement(s) de rattachement :** U. PARIS-DAUPHINE, CNRS  
**Laboratoire(s) partenaire(s) :** CEREMADE (7534)

**CRI :** Centre Inria de Paris  
**Localisation :** Centre de recherche Inria de Paris  
**Code structure Inria :** 021122-1

**Numéro RNSR :** 201321083P  
**N° de structure Inria:** SR0716ER

### Présentation

The last two decades have witnessed a remarkable convergence between several sub-domains of the calculus of variations, namely optimal transport (and its many generalizations), infinite dimensional geometry of diffeomorphisms groups and inverse problems in imaging (in particular sparsity-based regularization).

This convergence is due to (i) the mathematical objects manipulated in these problems, namely sparse measures (e.g. coupling in transport, edge location in imaging, displacement fields for diffeomorphisms) and (ii) the use of similar numerical tools from non-smooth optimization and geometric discretization schemes.

Mokaplan team members have been at the heart of the convergence. Optimal Transportation , diffeomorphisms and sparsity-based methods are powerful modeling tools, that impact a rapidly expanding list of scientific applications and call for efficient numerical strategies.

The dynamical formulation of optimal transport creates a link between optimal transport and geodesics on diffeomorphisms groups. This formal link has at least two strong implications that \mkp's will elaborate on: (i) the development of novel models that bridge the gap between these two fields ; (ii) the introduction of novel fast numerical solvers based on ideas from both non-smooth optimization techniques and Bregman metrics.

In a similar line of ideas, we believe a unified approach is needed to tackle both sparse regularization in imaging and various generalized OT problems. Both require to solve related non-smooth and large scale optimization problems. Ideas from proximal optimization has proved crucial to address problems in both fields. Transportation metrics are also the correct way to compare and regularize variational problems that arise in image processing. This unity in term of numerical methods is once again at the core of our research

**Axes de recherche**

**Relations industrielles et internationales**

### Contact

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### En savoir plus

- Site sur [inria.fr](http://inria.fr)
- Site du [responsable](#)
- Derniers Rapports d'Activité : [2015](#) , [2016](#) , [2017](#) , [2018](#) , [2019](#) , [2020](#) , [2021](#) , [2022](#) , [2023](#)

### Documents sur la structure

- [Intranet](#)
- [Privés](#)

### Décisions

- **11306** (07/12/2015) : création
- **12548** (11/12/2017) : prolongation
- **15187** (14/12/2021) : prolongation
- **15855** (14/12/2022) : prolongation
- **16224** (02/06/2023) : prolongation
- **16415** (28/08/2023) : cessation du responsable
- **16416** (28/08/2023) : nomination responsable

### Localisation

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- **Coordonnées GPS :** 48.826, 2.346

