
Level of qualifications required: Graduate degree or equivalent
Function: PhD Position

About the research centre or Inria department
The Inria Sophia Antipolis - Méditerranée center counts 37 research teams and 9 support departments. The center's staff (about 600 people including 400 Inria employees) is composed of scientists of different nationalities (250 foreigners of 50 nationalities), engineers, technicians and administrators. 1/3 of the staff are civil servants, the others are contractual. The majority of the research teams at the center are located in Sophia Antipolis and Nice in the Alpes-Maritimes. Six teams are based in Montpellier and a team is hosted by the computer science department of the University of Bologna in Italy. The Center is a member of the University and Institution Community (ComUE) "Université Côte d'Azur (UCA)".

Context
Inverse potential problems, where a source is to be determined from measurements of the field at a distance from its support, arise in many scientific areas. Applications we have in mind here comprise the analysis of Electro-Encephalo-Graphic (EEG) data, where the location of foci of electric activity in the brain are to be found, as well as inverse magnetization problems in Paleomagnetism where the magnetization distribution is to be computed and yields important information on the past history of rocks. They share a common framework, namely the source is the divergence of a measure. However, the geometry of the measurements is different, as well as the fact that the field is harmonic in Paleomagnetism but only piecewise harmonic in EEG (where several layers separate the source from the measurement place). The purpose of the thesis is twofold: to study regularization techniques, based on constraining the total variation of the measure whose divergence is the source on the one hand, and to study the inverse propagation process of the field across the layers for the case of a piecewise harmonic field on the other hand. The geometry of the layers could typically be spherical or modeled on other smooth surfaces.

Assignment
The purpose of the thesis is twofold: to study regularization techniques, based on constraining the total variation of the measure whose divergence is the source on the one hand, and to study the inverse propagation process of the field across the layers for the case of a piecewise harmonic field on the other hand. The geometry of the layers could typically be spherical or modeled on other smooth surfaces.

This study will offer an opportunity to balance theoretical work in harmonic analysis with numerical work in optimization. In particular, experiments on real data will be conducted.

Main activities
To conduct research in the afore-mentioned subject.

Benefits package
- Subsidised catering service
- Partially-reimbursed public transport
- Social security
- Paid leave
- Flexible working hours
- Sports facilities

Remuneration
Duration: 36 months
Location: Sophia Antipolis, France
Gross Salary per month: 1982€ brut per month (year 1 & 2) and 2085€ brut/month (year 3)