Numerically validate the method of academic examples and study strategies to by Cakoni-Haddar-Lechleiter 2018 to the case of point sources. Sampling method for time dependent data. In particular, extending the recent results - Study the behavior of the indicator function provided by the generalized linear sampling method introduced by Audibert-Haddar in 2015. Scattering problem in time domain using the generalized version of the linear approach. The goal of this postdoc is to address theoretically and numerically the inverse scattering problem in its broad sense (with applications to a large number of areas ranging from non-destructive testing to medical imaging), especially in cases when linearization approximations fail: i.e. roughly speaking when the non-linearity of the inverse problem is sufficiently strong. This occurs as soon as the geometry of the unknown media generates non negligible multiple scattering effects (multiply-connected and closely spaced obstacles) or when the used frequency is in the so-called resonant region (wavelength comparable to the size of the sought medium). In this perspective we particularly developed so-called sampling methods. These methods are fast imaging solvers adapted to multi-static data (multiple receiver-transmitter pairs) at a fixed frequency. Even if they do not use any linearization of the forward model, they rely on computing the solutions to a set of linear problems of small size, that can be performed in a completely parallel procedure. The success of such approaches was their ability to provide a relatively quick algorithm for solving 3-D problems without any need for a priori knowledge on the physical parameters of the targets. These algorithms solve only the imaging problem, in the sense that only the geometrical information is provided (even though the material properties are not known). In order to increase the accuracy of these methods and their statistical stability with respect to perturbations of the background fluctuations, combining the use of multiple frequencies is usually beneficial (which has been demonstrated for linear approaches). Extension of sampling methods to time domain data was addressed in the past for the basic version of sampling methods that lacks solid mathematical justifications. Moreover, the use of time dependent data increase the size of the linear problem to solve for each sampling point and therefore substantially increase the cost of the inversion method. The 450 researchers and engineers from Inria and its partners who work in the research centre's 31 teams, the 100 research support staff members, the high-level equipment at their disposal (image walls, high-performance computing clusters, sensor networks), and the privileged relationships with prestigious industrial partners, all make Inria Saclay Ile-de-France a key research centre in the local landscape and one that is oriented towards Europe and the world. A large part of our research activity is dedicated to the development of algorithms that solve the inverse scattering problem in its broad sense (with applications to a large number of areas ranging from non destructive testing to medical imaging), especially in cases when linearization approximations fail: i.e. roughly speaking when the non-linearity of the inverse problem is sufficiently strong. 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Assignment

The goal of this postdoc is to address theoretically and numerically the inverse scattering problem in time domain using the generalized version of the linear sampling method introduced by Audibert-Haddar in 2015.

Main activities

- Study the behavior of the indicator function provided by the generalized linear sampling method for time dependent data. In particular, extending the recent results by Cakoni-Haddar-Lechleiter 2018 to the case of point sources.
- Numerically validate the method of academic examples and study strategies to

Context

About the research centre or Inria department

Located at the heart of the main national research and higher education cluster, member of the Université Paris Saclay, a major actor in the French Investments for the Future Programme (Idex, LabEx, IRT, Equipex) and partner of the main establishments present on the plateau, the centre is particularly active in three major areas: data and knowledge; safety, security and reliability; modelling, simulation and optimisation (with priority given to energy).

The 450 researchers and engineers from Inria and its partners who work in the research centre's 31 teams, the 100 research support staff members, the high-level equipment at their disposal (image walls, high-performance computing clusters, sensor networks), and the privileged relationships with prestigious industrial partners, all make Inria Saclay Ile-de-France a key research centre in the local landscape and one that is oriented towards Europe and the world.

Defence Security :

This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST). Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

Recruitment Policy :

As part of its diversity policy, all Inria positions are accessible to people with disabilities.

Conditions for application

Applicants have to provide the following documents to be considered at the selection procedure:

- CV
- publication list and 2 representative publications (that you judge representative of your work)
- motivation letter (explaining why the selected topic, how do you think you can fit the topic, what are your motivations for the topic compared to your previous work, etc)
- 2 recommendation letters
- perspective of professional insertion after the post-doc

General Information

- Theme/Domain : Numerical schemes and simulations
- Town/city : PALAISEAU
- Inria Center : CRI Saclay - Ile-de-France
- Starting date : 2018-11-01
- Duration of contract : 1 year, 4 months
- Deadline to apply : 2018-04-10
increase the speed based on sparse representations of the data.
- Explore the use of other choices of penalty terms than the one proposed in Cakoni-Haddar-Lechleiter 2018.
- Extend the methodology to handle the case of rough surfaces and/or periodic domains (with application to near field optics).

Skills
Solid background in functional analysis, numerical methods for partial differential equations and scientific programming. Experience in inverse and ill posed problems is a plus.

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

Remuneration
Monthly gross salary: **2,653 euros**