2018-00497 - Solitary waves in the two-dimensional Borridge-Knopoff model - Post-Doctorant Inria Grenoble Research center

**Contract type:** Public service fixed-term contract  
**Level of qualifications required:** PhD or equivalent  
**Fonction:** Post-Doctoral Research Visit

**About the research centre or Inria department**

Grenoble Rhône-Alpes Research Center groups together a few less than 800 people in 35 research teams and 9 research support departments.

Staff is localized on 5 campuses in Grenoble and Lyon, in close collaboration with labs, research and higher education institutions in Grenoble and Lyon, but also with the economic players in these areas.

Present in the fields of software, high-performance computing, Internet of things, image and data, but also simulation in oceanography and biology, it participates at the best level of international scientific achievements and collaborations in both Europe and the rest of the world.

**Context**

Guillaume James and Arnaud Tonnelier,  
TRIPOP, Nonsmooth dynamical systems.  
INRIA-Grenoble, Montbonnot.  
French

**Assignment**

Subject: Applications are invited for a postdoctoral research fellowship in the area of dynamical systems and its applications to geophysical systems.

The Burridge-Knopoff model [1] is a nonlinear lattice differential equation that describes some mechanisms of earthquakes along faults. In the classical one-dimensional (1D) version of this model, one side of the fault is discretized as a chain of blocks connected by springs.

Each block is pulled over a surface and subject to a nonlinear friction force. For some classes of non-monotonic friction laws, the system is excitable and perturbations lying above some threshold can evolve into a solitary wave [2].

Previous work on solitary wave propagation has mainly focused on the 1D slider-block model. However more realistic models for earthquakes must take two-dimensional (2D) effects into account. The goal of this project is to analyze wave propagation in a 2D version of the Burridge-Knopoff model.

Using an idealized velocity-dependent friction force, the applicant will carry out theoretical and computational research on the dynamics of the 2D model with a special emphasis on localized waves.

**References:**


**Main activities**

--

**Skills**

The ideal candidate should have a background in Applied Mathematics and should have an interest in applications of dynamical systems. The applicant should be able to perform independent scientific research.
software development (using Python, or Matlab, or Scilab environment).

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

Remuneration
Gross salary: 2650 Euros per month