JOB POSITION

Post-Doctoral position in Probability Theory and Statistics applied to drinking water network asset management

The French National Research Institute for Agriculture, Food, and the Environment (INRAE) is a public research establishment. It is a community of 12,000 people with more than 200 research units and 42 experimental units located throughout France. The institute is among the world leaders in agricultural and food sciences, in plant and animal sciences, and is 11th in the world in ecology and environment. INRAE's main goal is to be a key player in the transitions necessary to address major global challenges. In the face of the increase in population, climate change, scarcity of resources and decline in biodiversity, the institute develops solutions for multiperformance agriculture, high quality food and sustainable management of resources and ecosystems.

WORKING ENVIRONMENT AND ACTIVITIES

■ You will be welcomed in the unit ETBX

The post-doctoral work contributes to the interdisciplinary collaborative research project « Drinking Water Network Multi-scale Asset Management » (GePaME), which is formalised by a three-years research contract signed by the GPIE team of the ETBX Research Unit and the Société Wallonne Des Eaux (SWDE). This project aims at rationalising the operations and expenses of monitoring, maintenance and renewal of drinking water networks operated by SWDE ; this involves dedicated Infrastructure Asset Management methods and tools (Allegre et al. 2012) that enable optimal access and use of informations available within various departments, while matching the organisational and gouvernance framework of SWDE.

GePaME project aims at i) understanding the pipe leakage process and improving leak detection operations, ii) helping the multi-objective and constrained selection of pipe renewal works, iii) designing long term simulations of water network asset management strategies.

Thirteen operational tasks structure the GePaME project that seek scientific progress promoted by INRAE, and decision aid tools that are to be integrated in the practices of SWDE and into its Information System. Among these tasks, two call for competences in probabilistic modelling and statistical calibration, concerning the leaking probability of a network segment, and in matter of coupling the pipe leakage and burst processes (Le Gat 2016), whereas two other tasks implement these models in the tools that respectively help the multi-objective and constrained selection of pipe renewal works (Renaud et al. 2012), and perform long term simulations of water network asset management strategies (Large et al. 2015). The ambition of these four tasks justify the support of a researcher in Probability Theory and Statistics during two years of post-doctoral work.

■ You will be in charge of:

Principal activities mainly involve a reflection process, as well as computer work, and on-site missions at SWDE, to support the collection of data relating to asset description and leakage and failure chronicles, and the direct collaboration with SWDE correspondents. Other missions will be devoted to the valorisation of the research work.

The post-doctoral work includes then a participation to :
- theoretical thinking concerning the leakage and burst processes, and their coupling,
- designing probabilistic modelling adapted to the complexity of the socio-technical system of SWDE, in relation with other studies in the project devoted to more technical, sociological or - economic aspects that pertain to pipe leakage, bursts or renewals,
- drafting model calibration algorithms,
- supervising the collection of data needed to calibrate the models,
- embedding the models into algorithms of multi-objective selection of pipe replacement works, and of long term simulation of asset management strategies,

- working out study reports that document the design of theoretical tools, as well as their practical implementation into the SWDE Information System,
- writing scientific journal and conference communication papers for bringing out the works of the project.

■ Special conditions of activity:

The research work will develop in interdisciplinarity within a pluridisciplinary research team (probability theory and statistics, engineering science of pressure networks, economics and sociology). The applicant should have also proven abilities in scientific paper writing (a reasonable mastering of written English will be appreciated).
The position proposed by ETBX Research Unit is a 24 months fixed-term contract, contract governed by public law.

TRAINING AND SKILLS REQUIRED

■ Recommended training:
The applicant should hold a PhD in Applied Mathematics, or akin, option Probability Theory and Statistics.

■ Knowledge required:
The applicant should prove competence and experience in probabilistic modelling, and more specifically in stochastic processes and statistical calibration of models.

■ Appreciated experience:
Experience in applied statistics in the field of water network asset management would be appreciated.

■ Skills sought:
Capacity in using a statistical software such as R system, to process data and code customised functions to perform model calibrations and carry out complex simulations and graphical representations would be highly appreciated.

The fully digital application file will include : letter of motivation, CV, doctoral dissertation, and any document (published papers or other) that could relevantly help inform the decision of the recruitment panel.

↘ Reception modalities

■ Unit: ETBX
■ Postal code + city: 33612 CESTAS
■ Type of contract: Fixed-term contract
■ Duration of the contract: 2 years
■ Starting date: 2021-05-01
■ Remuneration:
between circa 2371 and 2730 € gross / month according to experience

↘ How to apply

Send a motivation letter and a CV to :
Yves LE GAT

■ By e-mail: yves.legat(at)inrae.fr

■ By postal way:
INRAE, 50 avenue de Verdun, 33612 Cestas Cedex

 Deadline for application: 2021-02-28