Power flow divergence analyzer

Developing a tool to improving the understanding of power flow divergences

Why join Artelys

Artelys is specialized in mathematical optimization, quantitative decision-making and scientific modeling. Relying on its high level of expertise in quantitative methods, Artelys delivers efficient solutions to complex business problems. They provide services to numerous industries: Energy, Transportation, Telecommunications, Manufacturing, etc. Artelys is an international company with offices in France (Paris, Lyon, Nantes), Canada (Montréal), Belgium (Brussels), and the USA (Chicago).

Artelys offers several products and services, including software solutions (mathematical optimization software, business specific customized and custom solutions), studies, consulting, training, etc. In particular, Artelys consultants deliver operational solutions that perform security analysis of power grids, i.e. simulations that check that the power grid will be safely operated on the short term (e.g. one day ahead). It involves performing a massive amount of power flows that evaluates the repartition of power flows on the grid from generation to loads.

Description

Power flows are usually based on a Newton Raphson algorithm to solve a non-linear system of equalities. Unfortunately, when the algorithm does not converge, it comes with no proof of infeasibility and with scarce information about the divergence origin. By transforming the problem into an Optimal Power Flow (OPF) with the introduction of well-chosen slack variables, it is possible to find the minimal set of changes to the power grid that would lead to feasible solution.

The intern will design and implement a dedicated OPF for divergence analysis using the power system modeling library PowSyBl, the algebraic modeling language AMPL, and the non-linear solver Artelys Knitro and test it on realistic datasets.

What we are looking for

The candidate must be in his/her last year of master's degree in computer science and/or applied mathematics and/or power systems and/or operations research.

Required skills:

- Mathematical optimization

Valued skills:

- Knowledge of algebraic modelers (AMPL, Pyomo,…)
- Power Systems (Power Flows and Power System Economics)
- Programming in Java
- Programming in Python
- Fluent in French

Benefits

The duration of the internship is 6 months. The internship will take place in our Paris office. The internship may lead to a long-term job offer.

Application

Send us your cover letter and curriculum vitae via the Artelys website: www.artelys.com/careers/