Internship position

Finite element modeling of a leaky hydraulic coupling with O-ring seal

Applicant profile

You are a Master 2 student majoring in mathematics, applied mathematics, or computer science. You have outstanding skills at finite element modeling (FEM), and have implemented or at least used such models yourself in the past. You also have good C, C++ programming skills; optionally, you have good Linux sysadmin skills.

Internship subject

Using the FreeFEM++ tool, you will create a 2D axisymmetric model of a hydraulic coupling. This model will include two metal parts corresponding to the hydraulic connectors, as well as a toroidal elastomeric o-ring seal in-between them, and the fluid itself. The three solid parts will be in solid contact with friction, and subject to linear elastic deformation. When the fluid pressure will be high enough, the fluid will separate the seal from one of the metal parts and infiltrate the gap, until it flows to the outside of the coupling.

Attaining the deepest level of understanding of this phenomenon, as well as of its correct modeling by finite elements, will be the main task of the internship. Despite its apparent simplicity, this is a difficult problem, and exploring it will help you gain solid fundamental and practical knowledge of the field of finite element modeling.

Context

You will be part of the Airthium Modeling team. You will work under direct supervision of the head of numerical modeling, with regular contact with the CTO/CSO, and you may interact with professors from the Jacques Louis Lions Laboratory (LJLL) of the UPMC University. Our offices are located at the Ecole Polytechnique in Palaiseau (RER B Station Massy Palaiseau).

Airthium is a startup making novel electricity storage modules based on heat at an extremely low cost. Those modules will store the excess solar and wind energy produced in unreliable grids (islands, developing countries) or where conventional generation cannot compensate a large share of renewables in the energy mix. It will then deliver the energy when it is needed.

Apply

Send your C.V. with cover letter to contact@airthium.com. Possibility of continuing the work in PhD, in association with the LJLL lab at the UPMC.