

## Internship for Master 2 level at the Institute Pprime, University of Poitiers, France

### Toolchain from the creation of the mesh to the CFD simulations

The performance of many industrial applications is largely based on the quality and reliability of the guidance and support systems (high rotational speeds, low friction torque, damping capability, etc.). The internship, lasting 4 to 6 months, is part of a ANR (Agency National Research) french project, entitled SOFITT (Saturated Open-pore Foams for Innovative Tribology in Turbomachinery) and aiming at finding innovative technical solutions that break with current practices and provide high-performance support systems in terms of load capacity and damping.

The project proposes a new concept of lubrication and correspondingly a new material (understood as a complex/composite material formed by the solid porous structure –compressible porous layers- and the imbibing fluid) in order to improve the quality and reliability of the guidance and supporting systems. The CFD (Computational Fluid Dynamics) simulations offer an economical solution to study the performance of this new concept of lubrication. The difficulty in performing CFD simulations in compressible materials is to access the geometry of their porous structure. The morphological structure of compressible materials can be reconstructed for different levels of compression starting from the 3D X-ray microtomography. This can be done by using a commercial software that enables to process 3D images and to create FE/CFD models suitable for numerical analyses. A procedure allowing the passage between the microtomography measurements and the numerical models will be developed during the internship proposed here.

This work will take place within two research teams of the Institute Pprime, HydEE of the FTC department and TriboLub of the GMSC department. The trainee sought is a student in the final year of an engineering school or Master 2, with good fluid mechanics skills and a strong taste for Digital image processing and CFD simulations. The student will be rewarded according to the legal provisions throughout the duration of his internship. If the student gives full satisfaction, he will be recruited for a thesis, funded by the SOFITT project.

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