Location: Cadarache,CEA/CadaracheFrance

Title: Development and exploitation of a fusion reactor system code

Contact: Cédric Reux (cedric.reux@cea.fr)

This is a post-doctoral position.

Job description:
Fusion by means of magnetic confinement aims at providing a new source of energy. Although it is still at the stage of research, it is important to start preparing the design of future magnetic confinement fusion reactors, especially with the construction of the ITER experiment at Cadarache. The main target of the proposed activity is to contribute to the design of the DEMO concept, a pre-industrial demonstrator which is the next step after ITER.

The primary tool for DEMO design studies is a system code which models all the subsystems of a fusion reactor: plasma, divertor, heating systems, tritium production and cycle, magnets, cooling systems, electricity production and recirculation. Codes modules dedicated to every reactor element are chained together in the system code to provide a consistent design.

The IRFM develops and exploits a system code called SYCOMORE to initiate an ambitious roadmap for the DEMO design. SYCOMORE is developed within the European work programme of integrated modelling and DEMO power plant studies. It is coupled to the state-of-the art framework URANIE to perform design optimization and sensitivity studies.

The proposed work involves developing and exploiting the SYCOMORE code to identify key design issues and sensitivities for DEMO. The development will consist in the integration of modules developed by CEA contributors or developing new modules in collaboration with external institutes (cost module, tritium plant, heating systems, advanced transport models, maintenance…). Improvements to the coupling and the use of the optimization platform are also considered, especially for advanced optimization methods. The exploitation phase will be focused on parametric and optimization studies on main DEMO design proposed by the community and possibly other design options. Results will be communicated and benchmarked within the European DEMO activities framework.

Profile:
The candidate must have skills in physics, modelling and code development. A background in magnetic fusion and/or optimization algorithms is an advantage