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Using ALYA in FUSION simulations

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Abstract
In this presentation, I will describe the use that in the FUSION group of the CASE department is made of the state-of-the-art parallel computational mechanics code system ALYA. Firstly, and as developers, building a deterministic neutron transport module: NEUTRO. The first simplified version of the transport module was developed as a MSc project and consist in a solver of the transport equation in two and three dimensional geometries, discretizing the angular variable using the Discrete Ordinates Method on unstructured meshes, and need to be improved in several aspect, one of the more important is referred to the use of adaptative meshes. After that and during this visit, new characteristics was added to the module that increase its complexity and allow realistic multi-physics predictions of typical benchmarks thinking in use the code to analyze particular properties of fusion reactors. Secondly, the description of the development of MAGNET: an Electromagnetic Model for High Temperature Superconductors (HTS) enables higher magnetic fields and current densities into the same ALYA system. Finally, as users, I will describe results of the participation of FUSION group into a reduced benchmark of CFD codes validation for convective heat transfer, organized by IDOM.

Short bio

Alejandro obtains a doctorate in physics at UBA in 2007, working in the development of codes for the simulation of the nuclear fuel in a reactor in operation under normal condition.

In 2008 he joined the CASE department under the direction of Dr. Jose Maria Cela at Barcelona Supercomputing Center (BSC). He worked at BSC for a period of three years in the European project named EUFORIA in the field of fusion energy, with the aim to create a net of software dedicated to ITER (www.iter.org) simulation.

At present, Alejandro is Independent Researcher at the CONICET, researcher in CNEA and Part-time Professor at the Instituto de Tecnología Nuclear Dan Benison at UNSAM. He has collaborations with diverse research groups in Argentina and Spain, and has six PhD students under his supervision.