Lourenço, Pedro Deus
PhD Student – APPLAuSE [Técnico Lisboa]
plourenco@ipfn.tecnico.ulisboa.pt

PhD Thesis Abstract

Real-Time Plasma Position Reflectometry employing MARTe Framework

On future Controlled Nuclear Fusion reactors, operation cannot rely only on the control solutions presently available. For devices like the International Thermonuclear Experimental Reactor (ITER), microwave based diagnostics present a viable alternative to magnetic diagnostics in plasma position determination by avoiding offset integration errors. Microwave reflectometry has been tested as a robust technique to determine radial density profiles and plasma position. Recently, its successful implementation in plasma position control at ASDEX Upgrade opened the possibility to test it into other devices and control frameworks. Alongside, a new version of the Multi-threaded Application Real-Time executor (MARTe) framework, employed on several fusions devices, is being developed under the scope of making it compliant with Quality Assurance standards (MARTe-QA). One successful application of MARTe was in the COMPASS Tokamak which presents an ITER-like geometry and H-mode operation. Therefore, integrating the reflectometer diagnostic on the MARTe framework would provide real-time density profile reconstruction. Hence, this project provides a unique opportunity to join two elements that will possibly play a role on ITER operation. Consequently, the thesis project lays on two main objectives: (i) to validate Plasma Position Reflectometry (PPR) on a different device and using a different real-time framework and (ii) to characterize the stability and performance of the new MARTe-QA.