

First simulations for the ETE Spherical Tokamak discharges using the CRONOS suite of codes

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This work presents a description of the edition interface of the CRONOS code applied for discharge simulations of the ETE spherical tokamak. The CRONOS code was made available to LAP/INPE (Laboratório Associado de Plasma/INPE) in 2010, under an agreement with the Commissariat à l'Énergie Atomique (CEA-Cadarache, in France), and has been installed in a cluster formed by eight PC machines, each of them with a dual core Athlon X2 AMD processor, 2GB RAM, and whose operating systems are Linux Fedora and Scientific Linux. The code has also been installed and configured in a server HP DL380G7 with two processors Intel Xeon 5670, 16 GB RAM, on a Scientific Linux platform. The CRONOS package consists of a modular code that integrates several numerical routines responsible for various tokamak plasma phenomena computations and tokamak auxiliary systems simulations, which are able to provide predictive or interpretative calculations of a full tokamak discharge [1]. The core of the CRONOS package consists of a 1D transport code integrated with a 2D magnetic equilibrium calculation, which is coupled with all other routines that account for heating and current drive techniques, impurities and plasma radiation, plasma instabilities, pellet injection and plasma edge models. Generally speaking, the edition interface of the CRONOS code consists of a set of windows built in a MATLAB framework that allows the input of several plasma parameters as well as the choice of different models for the transport equations and for the heat, particle and momentum sources besides neoclassical and plasma edge models available in the code. Given the complexity of this package we start presenting a description of parameters and models adopted for an ETE discharge simulation, giving details of the main numerical settings adopted for the evolution of the several equations and respective boundary conditions that lead to acceptable plasma parameters and profiles obtained in ETE plasmas. Details regarding the computational point of view as computation efficiency, code parallel execution configuration and comments on the performances obtained in the different available hardwares, are given in another paper presented in the same meeting.

[1] J.F. Artaud et al. 2010 *Nuclear Fusion* **50**, 043001.