Interfacing TORIC and SSFPQL codes for ICRF selfconsistent simulations in Tokamak plasmas

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Simulations of tokamak plasma heating in the Ion Cyclotron Range of Frequencies (ICRF) requires iterating between a solver of the wave equations in toroidal geometry (TORIC [1]) and a solver of the Fokker-Planck equation describing the evolution of the ion distribution functions (SSFPQL [2]). The coefficients of the wave equations are built by taking into account the suprathermal ion populations predicted by the kinetic solver [3]. A huge amount of data must be stored and transmitted by SSFPQL to TORIC for this purpose. We have developed an interface which substantially reduces the memory and CPU time needed for this purpose. We present here this interface and an example of its use.

The Fokker-Planck equation, in turn, is coupled with the wave equations via the quasilinear diffusion operator describing the evolution of the ion distribution functions under the effect of the ICRF heating. To build the quasilinear diffusion coefficient from the results of wave code it is commonly assumed that the wave fields can be locally approximated near IC resonances by a plane wave. We discuss here briefly under which conditions this assumption can be justified.

