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P2.1084 1-dim Collisional Radiative impurity transport code with internal particle source for TESPEL injection experiments in RFX-mod2

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Clear evidences that, due to a strong outward impurity convection, impurity core penetration is prevented have been found in the RFX-mod RFP device. A comparable convection of the main gas has not been observed [1] so that a favorable situation with peaked or flat density profiles and hollow impurity profiles is produced. Analysis of impurity transport relies on best reconstruction of impurity emission pattern with a 1-dim Collisional-Radiative code in which the radial impurity flux is schematized as a sum of a convective and a diffusive term [2,3]. The diffusion coefficient D and the velocity V, which are input to the simulation are varied until the experimental emission is reproduced. While the steady-state impurity profile is determined by the ratio V/D (peaking factor), the discrimination between D and V requires transient perturbative experiments. The experimental evidence of impurity outward convection in RFX-mod helical regimes occurring at high plasma current (I>1.2 MA) has been found in Li and C solid room temperature pellets experiments [4], Ne doped D2 cryogenic pellet injection, Ne gas puffing and Ni LBO experiments [5] (W LBO didn't show accumulation effects too). Similar D and V have been found for all the considered impurity species, without strong dependence on mass/charge. RFX-mod is now being upgraded to RFX-mod2, aiming at reducing secondary tearing mode amplitude which affects the duration of the improved confinement Single Helicity states [6]. In order to perform more detailed analysis of the impurity transport inside the outward convection barrier, the impurity source should be further inside the plasma. With this aim, Ni-tracer encapsulated solid pellet (Ni-TESPEL) experiments are foreseen in the new device [7]. The available 1-dimensional, time dependent Ni Collisional Radiative code, used to reconstruct experimental Ni emissions in RFX-mod [4] has been upgraded in preparation of such experiments in RFX-mod2 including the possibility of a Ni source (boundary condition) inside the plasma, placed in a time dependent position. The solid pellet injector already used in RFX-mod to inject C and Li solid pellets, will be adapted to inject TESPEL in RFX-mod2 (0.7/0.9 mm polystyrene ball with Ni powder inside, injection velocity up to 200 m/s can be reached). In this contribution, the solid pellet injector will be described, simulations of the pellet ablation [8] for different scenarios of RFX-mod2 plasma will be presented, Ni ion density, line and continuum emission profiles predicted by the code will be described and discussed.

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