Study of ion cyclotron heating scenarios and fast particles generation inthe divertor tokamak test facility

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Abstract:
In this study we are investigating the physics of ion-cyclotron resonance heating(ICRH)plasma interaction in the Divertor Tokamak Test facility, on the basis of the plasma and tokamak parameters characterizing the machine, as well as the antenna design. An assessment of the ICRH scenarios which involves(i)frequency choice,(ii)power spectrum,(iii)minority H and/or3He heating,(iv)deuterium second harmonic heating,(v)fast particles energies, has been carried out. Well assessed numerical tools have been used for the solution of the relevant electromagnetic wave equation coupled to the quasi-linear Fokker–Planck equation for the ion distribution function, and the Torino Polytechnic Ion Cyclotron Antenna has been used to calculate the launcher design and the coupling performance of the antenna and the wave spectrum in presence of a plasma load. The wave spectrum especially represents an important input parameter for the numerical codes calculating the propagation and absorption of the ICRH wave. In this work the numerical results are reported and discussed with particular attention to the determination of the distribution function of the accelerated ions and its implication in th efast particle physics.