Role of combined NNBI and ICRH heating in FAST H-mode

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The combination of ICRH+NNBI in FAST allows the generation of fast ion populations with different velocity space anisotropy and radial profiles. These energetic ion populations can excite meso-scale fluctuations with the same characteristics of those expected in reactor conditions and, for this reason, FAST can address a number of important burning plasma physics issues. Numerical simulation and modelling of energetic particle physics are based on the use of various transport codes that are iteratively coupled with a bi-dimensional full wave-quasi-linear solver for ICRH, which also includes the solution of the Fokker-Planck equation for NNBI-plasma interaction. The ICRH frequency is in the range 80-85 MHz and the NNBI energy from 0.7 to 1 MeV, depending on species (hydrogen or deuterium). In this paper a parametric study of the normalized supra-thermal population pressure β_{hot} is presented and discussed in terms of ICRH+NNBI power deposition profiles with various minority concentrations (^{3}He 1-3%). The value of β_{hot} as well the energetic particle distribution functions can be used as initial condition for numerical simulation studies, investigating the destabilization and saturation of fast ion driven Alfvénic modes.