

Non-ambipolar Radial Transport of NB-produced Fast Ions including Charge Exchange Loss

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The beam-driven parallel flows in unbalanced tangential neutral beam injection (NBI) operations accompany the beam-driven non-ambipolar radial transport [1,2]. This fact will be important for the ambipolar condition in future quasi-symmetric stellarator experiments [3]. Not only the beam-driven transport of thermalized target particle species, but also the non-ambipolar flux of the NB-produced fast ions must be included in this ambipolar condition. This fast ions' flux can be calculated [4] by applying the adjoint equation method in Ref.[5]. However, it was clarified in recent FIDA and NPA measurements in Heliotron-J that the charge exchange (CX) loss of the NB-produced fast ions is not negligible in such small or medium-sized devices [6]. The substantial neutral particle density determining the energy-space reduction factor can be measured experimentally by using the FIDA [6]. The adjoint equation method [4,5] is still useful even when the CX loss term is added to the drift kinetic equation for the fast

ions. In this presentation, we show how the CX loss change the fast ions radial transport in the quasi-symmetric stellarators.

References

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