

Abstract Submitted
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Modeling of losses and confinement of NBI ions in LTX-beta tokamak¹ LEONID ZAKHAROV, LiWFusion, WILLIAM CAPECCHI, Princeton University — The LTX- β device in PPPL ($R = 0.36$, $a \simeq 0.24$ m, $b/a \simeq 1.6$) with lithium coated wall surface recently upgraded its capacities by installation of 20/30 keV/A NBI. Three years ago LTX demonstrated zero recycling in the transient phase of a decaying plasma. With NBI installed the low recycling regimes are envisioned for the flat top phase. Because of presently low toroidal field 0.3 T and plasma current $I_{pl} \simeq 75$ kA, the Larmor radius is as large as 7 cm for 20 keV H-ions. This raises concerns with their first orbit losses. Both NUBEAM of TRANSP and a special particle orbit code `3Dorb` with tracing of full and guiding center orbits were used for understanding the problem. The range of $I_{pl} = 75 - 150$ kA was considered in order to make specific guidance on necessary I_{pl} enhancement. The effect of the plasma charge due to ion losses was shown as suppressing the losses. While first orbit losses occur within 5-10 mksec, the confined fraction of hot ions has the confinement time of about 10 msec based on `3Dorb` simulations of hot ion collisions with the plasma. This promises a high performance regime, given that the first orbit loss problem solved. The results of comprehensive analysis of hot ion losses and confinement are presented.

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