**Compatibility of pronounced detachment with improved confinement on HL-2A tokamak**

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**Abstract**

This paper investigates the compatibility of pronounced detachment with improved confinement based on the NBI-heated HL-2A L-mode plasma with low-density. Through impurity seeding, radiation becomes higher at plasma edge and causes edge cooling after pronounced detachment. Turbulent transport is examined in detail by experiments and global integrated simulations. Ion dominant turbulent transport decreases at normalized minor radius $ρ\in [0.1, 0.4],$ and ion temperature increases at $ρ\in [0, 0.8]$. Edge turbulence and turbulent transport through ion channels decrease significantly, which could result from reduced free energy source due to edge cooling. The reduced edge turbulent transport benefits to decrease the power entering the SOL/divertor. The decreased edge outward transport and increased core electron density and ion temperature make major contributions to the improved plasma confinement after pronounced detachment.

Keywords: turbulence spreading, heat flux width, turbulent transport, $E×B$ shear