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Preliminary results of ELMy H-mode experiments on the HL-2A tokamak

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Abstract

Typical ELMy H-mode discharges have been achieved on the HL-2A tokamak with combined auxiliary heating of NBI and ECRH. The minimum power required is about 1.1 MW at a density of $1.6 \times 10^{19}\,\mathrm{m}^{-3}$ and increases with a decrease in density, almost independent of the launching order of the ECRH and NBI heating. The energy loss by each edge localized mode (ELM) burst is estimated to be lower than 3% of the total stored energy. At a frequency of typically 400 Hz, the energy confinement time is only marginally reduced by the ELMs. The supersonic molecular beam injection fuelling is found to be beneficial for triggering an L–H transition due to less induced recycling and higher fuelling efficiency. The dwell time of the L–H transition is 20–200 ms, and tends to decrease as the power increases. The delay time of the H–L transition is 10–30 ms for most discharges and is comparable to the energy confinement time. The ELMs with a period of 1–3 ms are sustained for more than ten times the energy confinement time with enhanced confinement factor $H_{89} > 1.5$, which tends to decrease with the total heating power. The confinement time in the H-mode discharges increases with plasma current approximately linearly.

(Some figures in this article are in colour only in the electronic version)