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Overview of experimental results on the HL-2A tokamak

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Abstract
The physics experiments on the HL-2A tokamak have been focused on confinement improvement, particle and thermal transport, zonal flow and turbulence, filament characteristics, energetic particle induced modes and plasma fuelling efficiency since 2008. ELMy H-mode discharges are achieved in a lower density regime using a combination of NBI heating with ECRH. The power threshold is found to increase with a decrease in density, almost independent of the launching order of the ECRH and NBI heating power. The pedestal density profiles in the H-mode discharges are measured. The particle outward convection is observed during the pump-out transient phase with ECRH. The negative density perturbation (pump-out) is observed to propagate much faster than the positive one caused by outgassing. The core electron thermal transport reduction triggered by far off-axis ECRH switch-off is investigated. The coexistence of low frequency zonal flow (LFZF) and geodesic acoustic mode (GAM) is observed. The dependence of the intensities of LFZFs and GAMs on the safety factor and ECRH power is identified. The 3D spatial structures of plasma filaments are measured in the boundary plasma and large-scale structures along a magnetic field line analysed for the first time. The beta-induced Alfvén eigenmodes (BAEs), excited by large magnetic islands (m-BAE) and by energetic electrons (e-BAE), are observed. The results for the study of fuelling efficiency and penetration characteristics of supersonic molecular beam injection (SMBI) are described.

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