Investigation of particle transport in deuterium and helium plasmas on EAST tokamak

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On EAST tokamak, we have investigated the plasma confinement in deuterium (D) and helium (He) plasmas with pure RF-heating and ITER-like tungsten divertor to support the ITER non-nuclear operational phase. The dependence of energy confinement on normalized density and collisionality shows a better energy confinement in deuterium plasmas than helium plasmas and the global energy confinement time in He is about 30% lower than in D over the density range of 2-5×10^{19} m^{-3}. After turning off the gas puffing and Supersonic Molecular Beam Injection (SMBI), the decay time of electron density in helium plasma is longer than that in deuterium plasma. This indicates that the particle confinement is better or the recycling due to low pumping rate is strong in helium dominant plasmas. Density modulation experiments have been done in both helium and deuterium plasmas. The comparison of perturbed transport coefficients and neoclassical ones in helium and deuterium plasma indicates the particle transport is both turbulence dominant. No obvious discrepancy of particle transport coefficient is found in D and He plasmas. Further analysis on density and temperature gradient shows that convective flux is driven by the temperature gradient with the same q95. Recent simulation indicates that the transport is TEM dominant and more simulation are underway using TGLF and TRANSP.