The frequency of minor collapses is about 0.8 times higher pulses outward, leading to minor collapses in the electric field causes a strong pressure gradient and MHD instability, formation of magnetic island and reaches a threshold pressure gradient near the electric field for the formation of magnetic island and reaches a threshold value of about 12 keV/m.

Formation of magnetic island and reaches a threshold value near the electric field for the formation of magnetic island and reaches a threshold value monotonically. The ITB criticality is quantitatively studied through the averaged electron density. The ITB threshold $P_{ECH}/\bar{n}_e$ value monotonically decreases as the ion mass increases. The role of the radial electric field for the ITB effect in tokamaks is extensively studied in a perturbative manner. Direct measurement of the electrostatic potential by heavy-ion beam probe (HIBP) suggested that the input power normalized by plasma density was lower in plasmas with heavier ions.

The mechanism of minor collapse (or sustainment) of e-ITB and its isotope effects have been studied considering the effects of magnetic island. The minor collapses of electron internal transport barrier (e-ITB) were repeatedly observed by controlling the rotation transform profile with electron cyclotron current drive (ECH) and neutral beam current drive (NBCD) to create a magnetic island around the e-ITB foot and increase the pressure gradient in the e-ITB region (Fig. 2(a)). The pressure gradient near the e-ITB foot increases due to the formation of magnetic island and reaches a threshold value of about 12 keV/m (Fig. 2(b)). When the pressure gradient reaches this value, the e-ITB collapses. The experimental results showed the possibility that the formation of $n/m = 1/2$ magnetic islands around the e-ITB foot causes a strong pressure gradient and MHD instability, and the resulting turbulent transport propagates heat pulses outward, leading to minor collapses in the e-ITB. The frequency of minor collapses is about 0.8 times higher in deuterium plasmas than in hydrogen plasmas, suggesting that the e-ITB is sustained in deuterium plasmas even at higher electron temperature gradients than in hydrogen plasmas.

The present works contribute both to understanding the dissipative structure formation affected by basic properties of the media and to the future fusion reactor development utilizing improved confinement scenarios.