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EX/P2-07 · Active MHD Instability Control and Confinement in the TPE-RX RFP

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Abstract: Experimental results using active methods in order to control the locked mode and to improve the confinement in the TPE-RX ($R/a = 1.72/0.45$) RFP, are presented. A phase- and wall-locked mode (LM) was found in the case of high plasma current (> 300 kA) and/or high filling pressure. The rotation of the LM has been attempted using an auxiliary rotating toroidal magnetic field. By applying the auxiliary field, the LM can be successfully delayed or even eliminated in the case of low plasma current (200 kA) with high filling pressure for the first time. As one of the active operations for an improvement of the confinement, pulsed poloidal current drive (PPCD) has been conducted by the auxiliary and main reversal toroidal field system. The soft X-ray in the PPCD becomes an order of magnitude larger than that in the standard case. The electron temperature, density and ion temperature increase during the PPCD. These results show considerable improvement of energy confinement. Another operation is the high electron density discharge using the fast gas puffing. The highest values of poloidal beta and energy confinement time are estimated to be obtained at the highest electron density case.



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EX/P2-08 · Property of Internal Transport Barrier Formation in JT-60U

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Abstract: Response of the ion thermal diffusivity (χ_i) to the radial electric field (E_r) shear has been investigated in JT-60U and the following results were found. (1) In the case of positive magnetic shear (PS) plasma, χ_i in the core region shows L mode state, weak internal transport barrier (ITB), and strong ITB depending upon the heating power. In the case of reversed magnetic shear (RS) plasma, however, no power degradation of χ_i is observed. (2) In the case of weak ITB, χ_i decreases gradually with increasing the E_r shear for both PS and RS plasmas. There exists a threshold of an effective E_r shear to change its state from weak to strong ITBs. (3) The threshold of the effective E_r shear in the case of RS plasma is small compared with that in the case of PS plasma.



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EX/P2-09 · Potential Formation and Confinement in High Density Plasma on the GAMMA 10 Tandem Mirror

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Abstract: After the attainment of doubling of the density due to the potential confinement, GAMMA 10 experiments have been directed to realization of a high density plasma and also to study dependence of the confining potential and confinement time on the plasma density. These problems are important to understand the physics of potential formation in tandem mirrors and also for the development of a tandem mirror reactor. We reported high density plasma production by using an ion cyclotron range of frequency heating at a high harmonic frequency in the last IAEA Conference. However, the diamagnetic signal of the high density plasma decreased when electron cyclotron resonance heating (ECRH) was applied due to some instabilities. Recently, the high density plasma production was much improved by adjusting the spacing of the conducting plates installed in the anchor transition regions, which enabled us to produce a high density plasma without degradation of the diamagnetic signal with ECRH and also to study the density dependence. In this paper we report production of a high density plasma and dependence of the confining potential and the confinement time on the density.