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## Response of Ion and Electron Temperatures, Electron Density and Toroidal Rotation to Electron Cyclotron Heating in JT-60U

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Temporal and spatial responses of the electron and ion temperatures ( $T_e$  and  $T_i$ ), the electron density ( $n_e$ ), and the toroidal rotation velocity ( $V_\phi$ ) with electron cyclotron heating (ECH) have been clarified for the first time with fast measurements in positive shear (PS) H-mode plasmas, weak shear (WS) plasmas with internal transport barriers (ITBs) and reversed shear (RS) plasmas with ITBs on JT-60U. We have found that: (i) Ion temperature inside the steep  $T_i$  gradient decreases with ECH after the  $T_e$  increase in PS and WS plasmas. The  $T_i$  reduction can be avoided with a large  $V_\phi$  shear ( $dV_\phi/dr$ ) that easily forms in RS plasmas. (ii) Electron density with peaked  $n_e$  profile decreases with ECH after the  $T_e$  increase. (iii) Counter intrinsic rotation is generated after the  $T_e$  increase and increases with the  $T_e$  increase. Time scale of the  $V_\phi$  change is much longer than that of the  $T_e$  increase [1]. The observations in the  $n_e$ ,  $T_i$  and  $V_\phi$  in PS plasmas are consistently explained by theoretical models and gyrokinetic (GK) calculations.

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