Observation of space and energy distributions of high-energy electrons produced in ECH plasmas of LHD


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The hard x-ray spectrum has been studied with x-ray pulse-height analyzer (PHA) in Large Helical Device (LHD). The hard x-ray emissions have been observed in high-temperature plasmas heated by electron cyclotron heating (ECH). The radial distribution of the hard x-ray emissions is successfully derived from the line-integrated spectrum obtained with PHA through Abel inversion. When the bulk electron density ranges at $2.0 \times 10^{12} \text{ cm}^{-3}$, the hard x-ray emissions are measured to be the most intense [1]. From the analysis of the data it is clearly understood that the high-energy electrons accelerated perpendicular to the magnetic field are localized in the radial position of $|\rho| \leq 0.2$. In addition the mean energy of the high-energy electrons is measured to be more than 100 keV. The confinement time of the high-energy electrons can be estimated from the exponential decay after turning off the ECH pulse. The present analysis suggests the confinement time of 80 msec.