

Operational progress of 170 GHz 1 MW ECH system in KSTAR

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EC heating and current-drive becomes an attractive tool for tokamak physics studies as well as plasma heating since the successful operation of ECH in KSTAR. The main issue for 170 GHz ECH system before the 2014 campaign was an achievement of 1 MW for 50 sec Gyrotron power to support the high-performance long-pulse discharges in KSTAR. The critical issue to be resolved is the cathode emission cooling which causes the decay of beam currents. As a countermeasure for this issue, the operating voltages for mod-anode and cathode heater are actively controlled to maintain the duration of oscillations at the cavity by changing the pitch factor and heating-up the cathode. The other issue for the long-pulse operation is actively water-cooled mirrors in the launcher. In the last year campaign, the original passively-cooled mirrors are replaced by actively water-cooled mirrors to enhance the power capability of the launcher system for steady-state operations. Therefore, 1 MW, 41 sec EC beams have been successfully injected to KSTAR. Also, the 170 GHz ECH system is used for the NTM control experiments. The PCS-integrated NTM controller is feedbacking the ECH power and the launcher mirror motor. This paper presents the long-pulse technical issues and operational progress of 170 GHz ECH systems as well as the results from NTM control experiments using the 170 GHz ECH.