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The development of 1 MW ECRH system on J-TEXT

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In 2019, a 105 GHz/500 kW/1 s ECRH system has been established on J-TEXT tokamak to improve plasma parameters and broaden operation range. This system consists of traditional subsystems including a gyrotron from GYCOM, a transmission line based on the corrugated waveguides, and a quasi-optical launcher, where the injection angle of the beam can be adjusted by the steerable mirror integrated in the launcher. Commissioning tests results showed the system could reach at least 450 kW output for 1 s. With this ECRH system, obvious heating effect was observed through various diagnostic signals, the core electron temperature was raised from 0.9 keV to 1.5 keV. Since 2021, another 105 GHz/500 kW/1 s ECRH system has been under development in order to reach 1 MW microwave output in total. The layout of the two 500 kW systems is shown in Fig.1. Based on the established 500 kW ECRH system, physical experiments have been carried out which are related to plasma heating, assisted start up, current drive, plasma disruption, magnetohydrodynamic (MHD) instabilities control, etc. With the developing 500 kW ECRH system, the operation range of J-TEXT will be further extended and more relevant experiments could be carried out.

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