Current status of heating and current drive systems on EAST

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EAST, a fully superconducting tokamak with divertor configurations, aims to perform long pulse high-performance plasma operation and explore the physics and technology associated with steady-state operation for next-step fusion devices. EAST has been equipped with all ITER-related continuous-wave (CW) heating and current drive (H&CD) systems with the total source power up to 32MW, including two lower hybrid wave (LHW) systems (4MW, 2.45 GHz, and 6MW, 4.6 GHz) for effective off-axis current drive and profile control, an ion cyclotron resonance heating (ICRH) system (12MW, with a wide frequency range of 25-70 MHz), a newly installed electron cyclotron resonant heating (ECRH) system (2MW, 140 GHz) for plasma kinetic control, stabilization of MHD modes, and a co-current neutral beam injection (NBI) system (4MW, 50-80 keV) which comprises two sets of neutral beam injectors. The above H&CD systems provide powerful tools for control of current profile.

In the past two years, efficiencies of power coupling, heating and current drive of the H&CD system have been investigated for capabilities and reliability enhancement, technical solutions for long pulse high power system commissioning have been explored during the R&D activities of H& CD systems. Experiments towards long pulse high performance discharge have been performed on EAST by flexible integration of all the external heating methods. H-mode plasma sustained by radio frequency (RF) systems or with the combined NBI system has been obtained. In this presentation, the progress of the development of the H&CD systems is summarized, as well as the experimental achievements.