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Theoretical Analysis of the ICRH Antenna's Impedance Matching for ELMy Plasmas on EAST

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A well-optimized design of an ion cyclotron resonance heating (ICRH) antenna is very important for steady-state plasma heating with high radio frequency (RF) power of several tens of megawatts. However, a sharp decrease in the coupling RF power because of impedance mismatch of ICRH system is an issue that must be resolved for present-day fusion reactors and International Thermonuclear Experimental Reactor. This paper has theoretically analyzed the ICRH antenna's impedance matching for ELMy plasmas on experimental advanced superconducting tokamak (EAST) by the transmission line theory. The results indicate that judicious choice of the optimal feeder location is found useful for adjustable capacitors' tolerance to the variations of the antenna input impedance during edge-localized mode (ELM) discharge, which is expected to be good for the design of ICRH antenna system and for real-time feedback control during ELM discharge on EAST.

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