ITER ICH Transmission Line and Matching System Prototype Development

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Design and testing of prototype components for the ITER Ion Cyclotron Heating (ICH) transmission line and matching system is underway. The performance of the prototype components will be qualified on a test stand operating at the full power and pulse length needed for ITER. The ICH transmission lines are pressurized 300 mm diameter coaxial lines with water-cooled aluminum outer conductor and gas-cooled and water-cooled copper inner conductor. Each ICH transmission line is designed to handle 40-55 MHz power at up to 6 MW/line. A total of 8 lines split to 16 antenna inputs on two ICH antennas. The ICH system is made up of 14 unique coaxial transmission line and matching components. A number of prototype components have been procured from industrial suppliers and are currently being evaluated. The matching system is designed to provide passive ELM tolerance through the use of hybrid couplers and loads, which can absorb the transient reflected power. In addition the system is design to compensate for coupling between antenna inputs caused by the mutual inductances of the current straps. It is further designed to balance as much as reasonable, the power requirements from the sources and the peak voltages on the antenna array elements. The matching system power sensors, arc detection and controls are also being developed and evaluated.