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Verification of the Simulated Radiated Power of the ICRH Antenna Design for Wendelstein 7-X with Experimental Results Using a Quarter Scale Mock-up Antenna

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An ICRH antenna consisting of two poloidal straps is now under design for W7-X in a collaboration between IEK-4/FZJ and LPP/ERM-KMS. The two straps are on one side connected to a tuning capacitor and grounded to the antenna box at the other end. To reduce the voltage in the feeding transmission lines and matching system, a pre-matching has been implemented by connecting the RF transmission lines at an intermediate position on each strap. This paper describes the optimization of this design to maximize coupling to the plasma using modern simulation codes (MWS, TOPICA) and its experimental validation obtained using a reduced scale mock-up, loaded with salted water and a ferroelectric dielectric to mimick the plasma.

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