

Abstract Submitted
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Improvements to the Folded Waveguide Antenna for ICRF Heating of Fusion Reactors.¹ TIM BIGELOW, CHUCK KESSEL, Oak Ridge National Lab, GREG HARTWELL, Auburn University — The Folded Waveguide (FWG) has been proposed as an improved high power density Ion Cyclotron Heating antenna that offers the advantages of a waveguide such as ceramic-free all metal construction, low electric fields at the plasma edge, built-in impedance matching, low mutual coupling in arrays. With recent interest in reactor relevant fusion experiments, the further testing of the FWG will offer significant capability particularly for high-field ICRF heated plasma devices. Proposed plasma testing at ORNL and Auburn Univ. will provide near-term physics results for high plasma density coupling performance that is needed for further development and acceptance of this type of antenna. A traveling-wave version of the FWG has been devised for use in certain applications, such as helicon wave launch and fast wave current drive, where a toroidal array of slots can be phased appropriately for optimum coupling to a directional plasma wave. Recent developments in additive manufacturing technologies have the potential to both simplify the fabrication of a complicated FWG face plate with interior helium gas cooling channels and improve its performance by permitting variation in metals between the inside rf and outside plasma facing regions. An additional feature that the FWG could offer is the use of tritium breeding ceramics to fill all or part of the antenna structure to further increase the neutron and energy performance of a fusion reactor.

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