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Simulations of lower-hybrid coupling in the Madison Symmetric Torus[1] JOHAN CARLSSON, DAVID SMITHE, Tech-X Corporation, MARK CARTER, Oak Ridge National Laboratory, MICHAEL KAUFMAN, University of Wisconsin-Madison — An analysis will be presented of radio-frequency (RF) coupling with the inter-digital line slow-wave antenna used for lower-hybrid (LH) heating and current drive at 800 MHz in the Madison Symmetric Torus (MST) reversed-field pinch (RFP). The primary simulation tool was the VORPAL code, but MicroWave Studio and RANT3D/AORSA1D-H were also used. Due to the special requirements of the RFP configuration (tight-fitting conducting shell in which only minimal portholes are acceptable to maintain MHD stability), the unusual inter-digital line antenna was chosen. Accessibility in MST requires a very large parallel wave number $k_\parallel$, with $N_\parallel = ck_\parallel/\omega > 7.5$. A blind V&V exercise done in vacuum showed excellent agreement for the phase difference between the antenna rods, with VORPAL and measurement differing by only 1.0°, but with MWS deviating more. Unfortunately the phasing excites a wave with $N_\parallel$ approximately 10% too small. With plasma, VORPAL gives $N_\parallel$ around 15% below the accessibility limit. VORPAL simulations performed on ANL Intrepid to investigate antenna modifications to increase $N_\parallel$ will also be presented.

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