Abstract Submitted
for the APR12 Meeting of
The American Physical Society

An Analysis of Lower Hybrid Grill Coupling Using an Efficient Full Wave Code[1] JOSEF PREINHAELTER, JAKUB URBAN, Institute of Plasma Physics, Czech Academcy, LINDA VAHALA, Old Dominion University, GEORGE VAHALA, William & Mary — Lower hybrid (LH) waves are very important for heating and current drive in tokamaks. A code is developed for 3D grills and the problem of efficient coupling: the power density spectrum, the power reflection coefficient, the power lost by the waves launched in the inaccessible region and the directivity of the waves. An efficient adaptive full wave solver is used to determine the wave propagation in a 1D plasma slab geometry. The very large number of 2D k-space infinite integrals for the coupling elements are solved using high order Gaussian quadratures combined with 2D B-splines in the accessible region. The code can handle large structures and many modes because the computational time is only weakly dependent on the size of the problem. An iterative evaluation of the integrands in the inaccessible region solves the currently overlooked near singular behavior of the integrands as well as the spectral power density associated with the eigenmodes. The role of collisions is clarified. We determine the 3D electric field in front of the grill and consider several COMPASS grills operating either at 1.3 GHz or 3.7 GHz with various waveguide phasing.

[1]Work supported by Czech Academy and DoE.

George Vahala
William & Mary

Date submitted: 05 Jan 2012 Electronic form version 1.4