

Effect of plasma fluctuations on lower hybrid current drive.

Y. Peysson and J. Decker

CEA, IRFM, 13108 Saint Paul lez Durance, France

Even though plasma fluctuations are characterized by low frequencies and long wavelengths with respect to the lower hybrid (LH) wave, the cumulative effect of small perturbations can impact the wave propagation and spectral properties significantly. In this work, the effect of fluctuations is included in the ray-tracing description of the LH wave. The model is based on a statistical description of plasma fluctuations, consistently taking into account the ordering between characteristics times involved in current drive calculations. The evolution of the electron distribution is described over long time steps with respect to the fluctuation correlation time, such that fluctuations can be considered a random process. For each time step, the wave propagation is calculated with the corresponding static perturbation of the axisymmetric toroidal MHD equilibrium. The direct influence of plasma fluctuations on the kinetic process is neglected, since power absorption usually occurs in regions of the plasma where fluctuations are supposed to be very small. The model is implemented in a current drive solver based on the fast ray tracing C3PO coupled to the 3-D linearized bounce-averaged relativistic Fokker-Planck solver LUKE. The effect of plasma fluctuations on LH current drive in the Tore Supra tokamak is investigated as a function of the fluctuating parameters (density, magnetic field) and the, localization and amplitude of fluctuations.