Parametric analysis of spectral intensity of electron cyclotron radiation coming out of plasma in ITER

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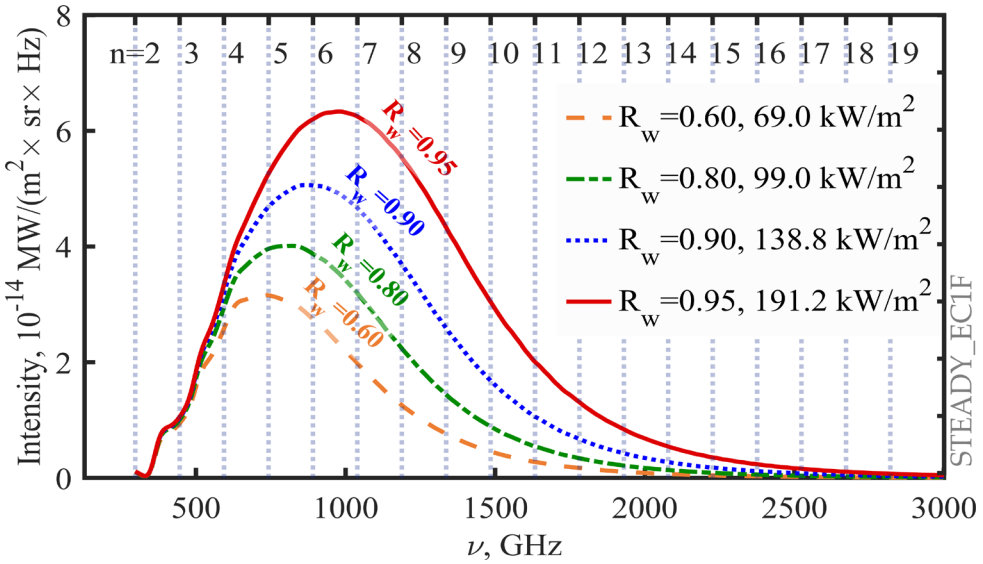
- Next-generation tokamak-reactors (ITER, DEMO): EC radiation from plasma will be an important factor: (**A**) significant role in the electron power loss balance, (**B**) **source of additional thermal and electromagnetic loads on microwave and optical diagnostic.**
- Impact of plasma-generated EC radiation upon diagnostics must be investigated (important for mm-wave diagnostics in ITER: microwave reflectometers and Collective Thomson Scattering system).
- 5 ITER scenarios considered. **CYNEQ code** calculations performed for the intensity of plasma EC radiation, emerging to the wall. Energy flux density in the range 30-200 kW/m^2 for the wall reflection coefficient in the range R_w=0.6-0.95 is predicted. The possible effect of this radiation on the in-vessel components and diagnostics of the ITER is estimated.



Steady-state ITER scenario

$\langle T_e \rangle_V$= 15.3 keV

$\langle n_e \rangle_V$= 0.52·10^{20} m^{-3}

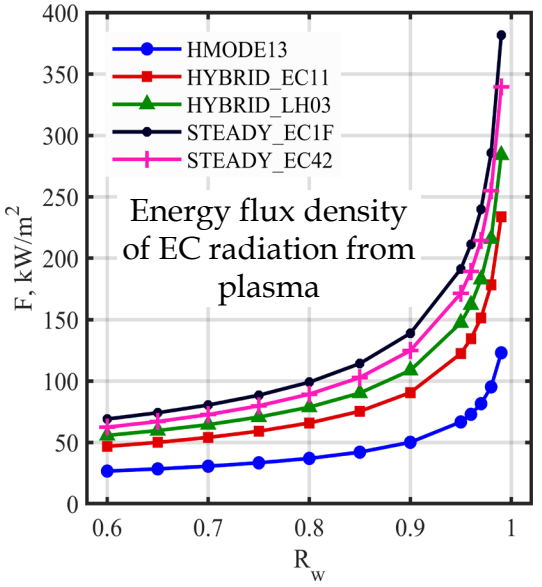
Energy flux density:

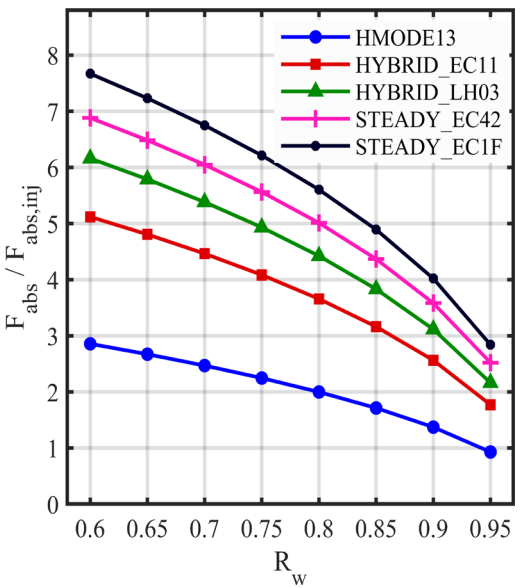
EC harmonics n ≥3,

R_w=0.9,

$F_{n\geq 3}$=138.8 kW/m^2

n=1, 2, $F_{1,2}$=2.7 kW/m^2





The ratio of two values of energy density absorbed by stainless steel material: (1) absorption of EC radiation emerging from the plasma at the flat-top stage of the discharge, F_{abs}, (2) absorption of ECH stray radiation at the start-up stage of the discharge, $F_{abs,inj}$ (injected total ECH power 6.7 MW, neglecting plasma absorption)