Efficiency improving modification to TOPICA® based on induction theorem.

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TOPICA® [1] is the most advanced code for simulating ICRF and LH antennas radiating into the plasmas. It can model antennas in 3D geometry and is coupled to the FELICE code [2] (FLR, 1D plasma profile). The code is based on FEL approach and implies use of basis functions, usually (~1-2 cm). These small basis functions has very wide spectrum of the radiated fields and for the plasma part of the problem cause heavy spectral integral calculations. A new approach to coupling TOPICA® and FELICE is presented here. It is based on the induction theorem and avoids basis functions spectral representation. Incident electric field on the aperture produced by the antenna in vacuum is calculated first. Then it is Fourier transformed (narrower spectrum) and fed into plasma module for reflected field calculation. The reflected fields are introduced back into the vacuum part of the problem in the form of sources situated on the plasma surface. New approach avoids calculation of up to several millions of spectral integrals with wide spectrum and should drastically improve TOPICA® efficiency.

[1] V. Lancellotti et al Nucl. Fusion **46** 1–24 (2006)
[2] M. Brambilla 1989 Plasma Phys. Control. Fusion **31** 723