

Upgrade of the TH1506B 118 GHz gyrotron using modelling tools

C. Darbos¹, A. Arnold², O. Prinz², M. Thumm², F. Bouquey¹,
JP. Hogge³, R. Lambert¹, C. Liévin⁴, R. Magne¹, E. Traisnel¹

¹*Association Euratom-CEA, CEA/DSM/DRFC CEA-Cadarache,
13108 St Paul lez Durance (France)*

²*Association Euratom-FZK, Karlsruhe (Germany)*

³*Association Euratom-Confédération Suisse, Lausanne (Switzerland)*

⁴*Thales Electron Devices, Vélizy, (France)*

The first TH1506B prototype showing problems of overheating and spurious oscillations, a new modified gyrotron was built. During the tests, the expected gaussian output beam presented two peaks, which was never predicted by simulations.

Various low level tests were performed on the mode converter with different shapes for the launcher but without real improvement. Besides measurements, the use of a new software Surf3D[1] showed that the problem mainly comes from the 3rd mirror whose curvature is too high and not well taken into account by the calculation. This analysis software is based on integral equations and the complete 3D modelling allowed to determine a new profile for the 3rd mirror. An aluminium model of a new mirror was manufactured and thorough low level tests made at FZK showed that there was no double peak.

The next step would consist in building a gyrotron based on this new design, to confirm the simulation and to validate it for long pulses.

[1] Analysis of the quasi-optical output system of a TE_{22,6} 118 GHz gyrotron, H.O. Prinz et al., Proc EC-14, 2006.