

## **Gyrotron Simulations with CST STUDIO SUITE®**

Monika .C Balk<sup>1</sup>

<sup>1</sup>CST AG, Bad Nauheimer Str. 19, 64289 Darmstadt

### **ABSTRACT**

Gyrotrons are interesting devices, since they can provide high output power at high frequency without the disadvantage of miniaturization. In contrast to Traveling Wave Tubes (TWTs) the dimensions of a Gyrotron do not depend on the operation frequency, but on the electron cyclotron resonance of particles in an external magnetic field.

An efficient way of predicting the performance of such a device is via simulation. This paper describes the simulation of two different gyrotrons. One is a 42 GHz gyrotron according to [1], which is analysed in its startup behaviour. Another one is a gyrotron working in fundamental mode at 12.6 GHz. Recently implemented features to aid such a simulation are shown. Variation studies concerning B field and beam properties are described. All simulations of the oscillation process are performed using a graphical processing unit (GPU). Results agree nicely to MAGIC (see [2]) and to EURIDICE [3].

### **References**

- [1] Ashutosh, B. Ravi Chandra, and P. K. Jain, "Multimode Behavior of a 42 GHz, 200 kW Gyrotron," Progress In Electromagnetics Research B, Vol. 42, pp. 75-91, 2012
- [2] 3.Xiang Li, Jiandong Lang, Yasir Alfidhl and Xiaodong Chen, "MAGIC 3D simulation of starting process of oscillation in a 42 GHz gyrotron," IET 1st Annual Active and Passive RF Devices Seminar. Glasgow, UK, 29 October 2013.
- [3] Anton Malygin et al, "Analysis of Mode Competition in 10kW/28GHz Gyrotron", Proceedings of the 14th IEEE International Vacuum Electronics Conference (IVEC), Paris, France, 2013.