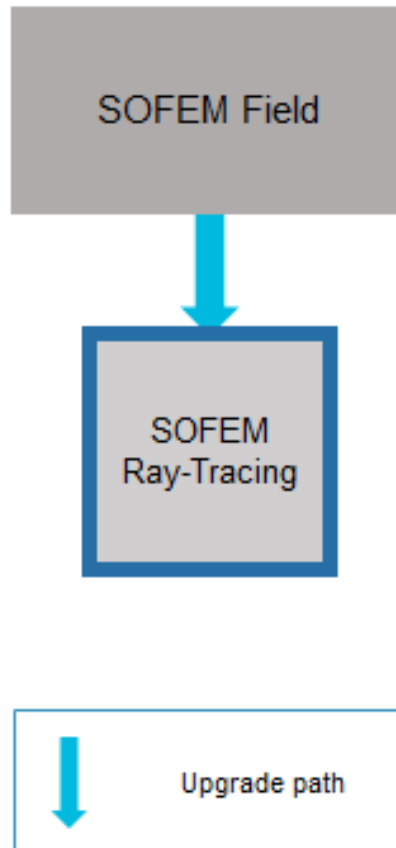# SOFEM Ray Tracing

2D Second Order Field Computation and Direct Ray Tracing


Overview

The SOFEM Ray-Tracing software provides the facility for the computation and plotting of electron trajectories using direct ray-tracing through the computed electrostatic and magnetic lens fields. Since the field components are obtained to a high accuracy (typically better than 1 part in 10000), the trajectories obtained with this software are very accurate, and can be used to estimate the lens aberrations directly from the raytrace.
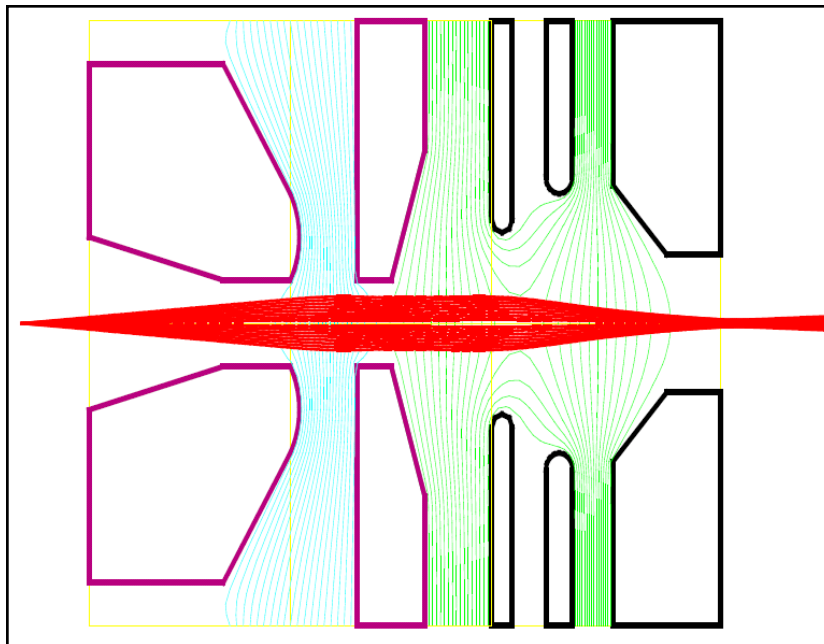
Ray-trace in combined magnetic-electrostatic lens

After computing the lens fields, direct ray-tracing in the rotationally symmetric fields is performed using a Runge-Kutta formula. The field components at each point on the trajectory are obtained by interpolation between five second-order finite elements.

The output of the program includes the computed coordinates, energies and angles of the trajectories at the specified screen plane. The coordinates of all the trajectories are stored in a binary file, which can subsequently be used for plotting the trajectories. If required, the program can also generate a file containing the (*x,y,z*) coordinates, the velocity components, the electrostatic field components, the magnetic flux density components, the elapsed time, the kinetic energy and the potential at each point on the trajectories.
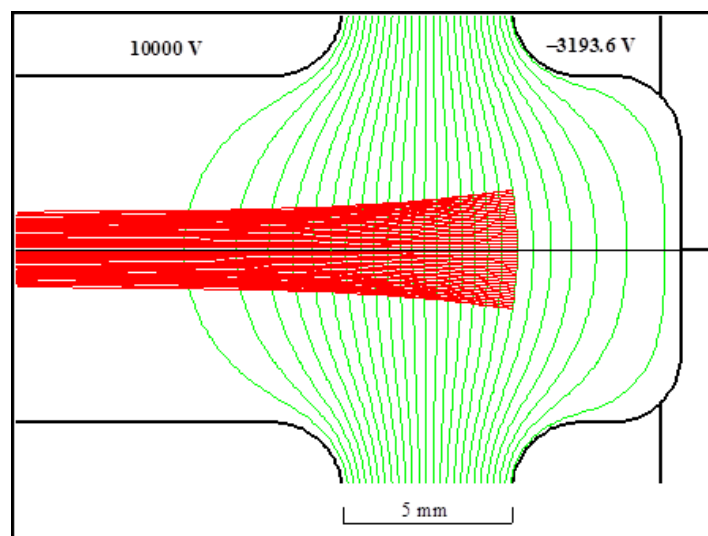
Direct ray-trace in an electrostatic mirror