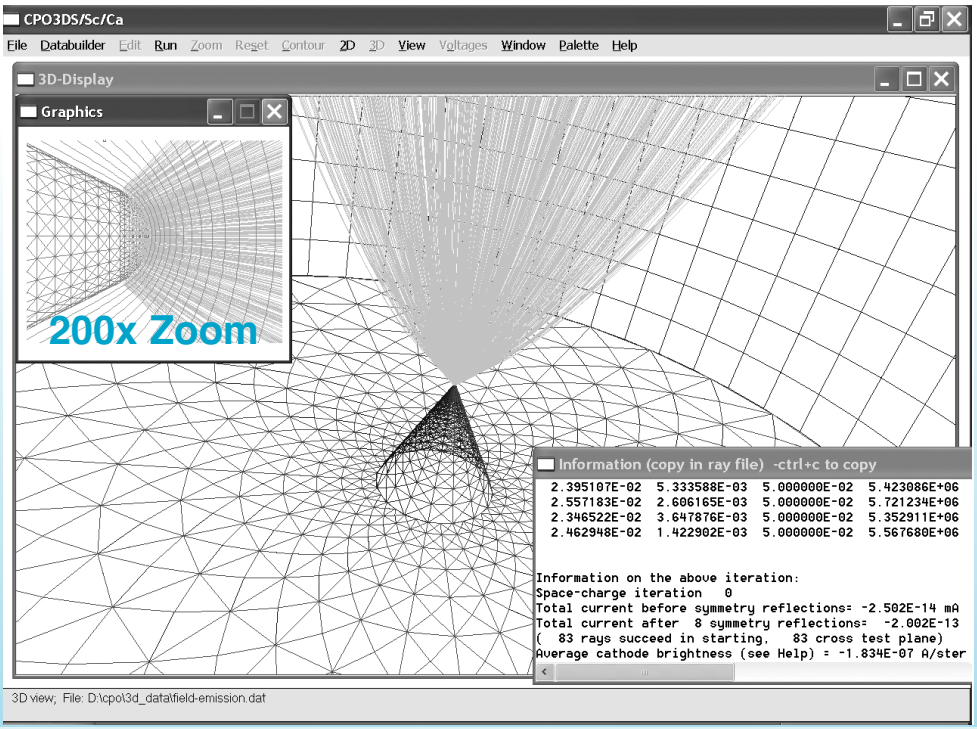
CPO Advanced Charged Particle Optics Simulation Software

CPO is a general purpose particle optics simulation package that can be used independently of or with SIMION. It is particularly suited for systems requiring space charge cathode emissions, high accuracy (even with open, curved, or high aspect ratio boundaries), charge calculation, and dielectrics.

Highlights

- **Extremely accurate** field and trajectory calculations based on the Boundary Element Method (BEM), which is fundamentally different than traditional FDM and FEM methods, as it involves surface charge calculation without the necessity of a volume mesh. CPO's BEM provides unique features, space-charge simulation capabilities, and accuracy - proven with over 200 benchmark and other examples.
- **Vast range of capabilities** and options supported by a comprehensive help system and examples.
- **Developed continuously since 1974** by one of the leading research groups in electrostatic systems (University of Manchester, UK).

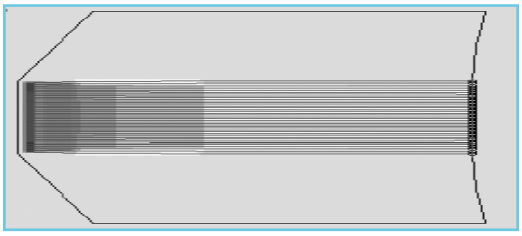


A typical example that really exhibits the benefits of CPO is shown above. A tiny, round field emission cathode at the tip of a cone is surrounded by large enclosing electrodes with potential difference applied across them. A surface mesh conforms to the surfaces of the electrodes and gets denser closer to the critical cathode tip. Surface charges are calculated, and from these are calculated ray trajectories. Ray currents are determined from the fields (and space charge) near the tip, which requires high accuracy calculations in this critical region. Optional space charge iterations (important for thermionic and Schottky cathodes) may be performed in which the mutually dependent fields and space-charge trajectories are solved alternately until convergence.

http://www.simion.com/cpo

Examples of Capabilities

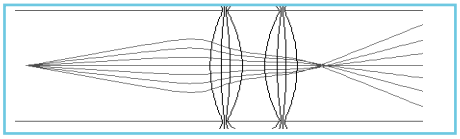
CPO has capabilities to support a broad range of simulations . . .



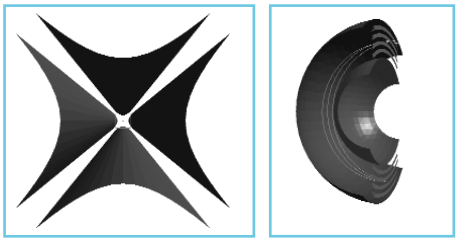
Pierce Gun

Field, trajectory, and space-charge solving can be done, even if mutually dependent. At left, a pierce gun - one of the space-charge examples - has space-charge limited current (Child's Law) and beam repulsion calculated to accuracy within considerably under 1% (non-space-charge systems are regularly orders of magnitude under 1%). Various types of thermionic and field emission (e.g. Fowler-Nordheim) cathode properties, including special handling at the critical space-charge cathode region are built-in.

Electrostatic lens systems and energy and mass analyzers are calculated to high accuracy. Aberration coefficients and lens properties can and calculated. Voltages may be oscillated or time dependent at low frequency, (typically MHz range) as in the quadrupole or ion trap.

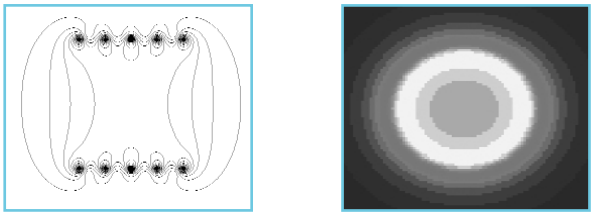


Einzel Lens



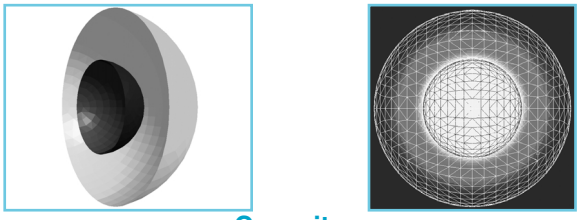
Quadrupole and Hemispherical Analyzer

Magnetic elements of various types such as solenoids, wire currents, and user-defined fields are available.



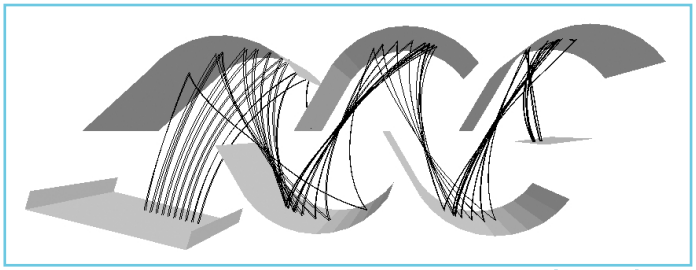
Magnetic Contours of Solenoid Coil

Dielectric materials, such as for field and capacitance calculations, are supported in the dielectric option



Capacitor

Secondary emission with user selectable properties can be generated when a particle hits an electrode surface. An optional **scattering** module allows collision or scattering effects such as due to background gas via user defined C++ routines.



Photomultiplier

Additional Information Available at:

http://www.simion.com/cpo

Versions Starting at around US $3000.00

- Request a **free 30-day fully working version of the CPO software and intro manual.**
- Learn the unique features of the Boundary Element Method (BEM).
- Locate hundreds of examples and papers demonstrating the applications of CPO.

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