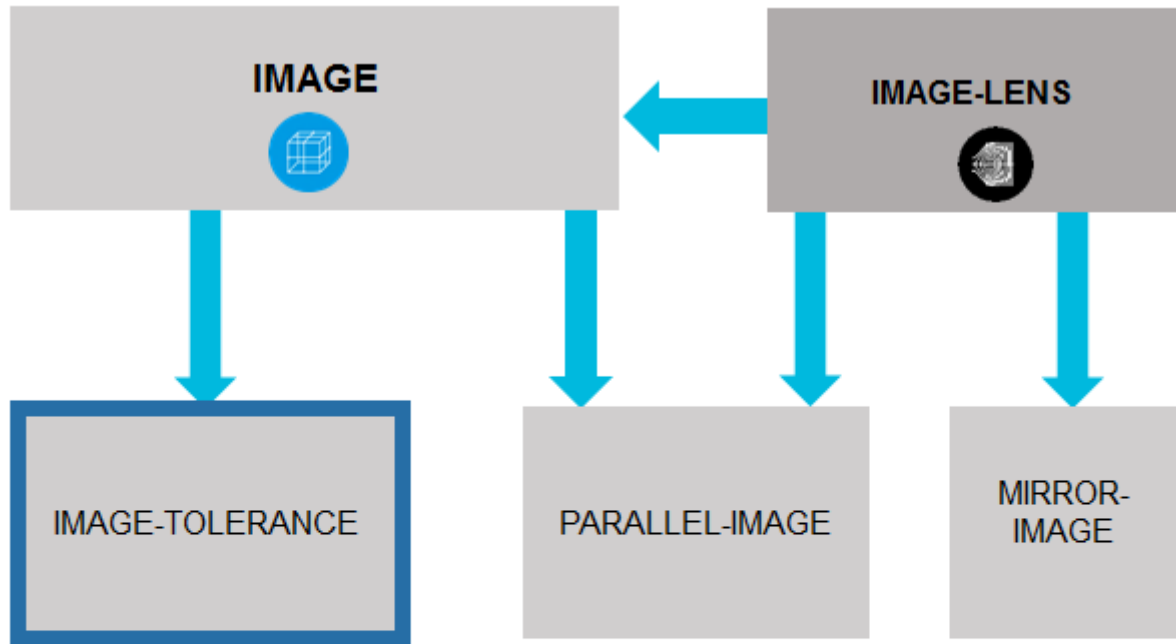


IMAGE-TOLERANCE

Upgrade for tolerancing capability



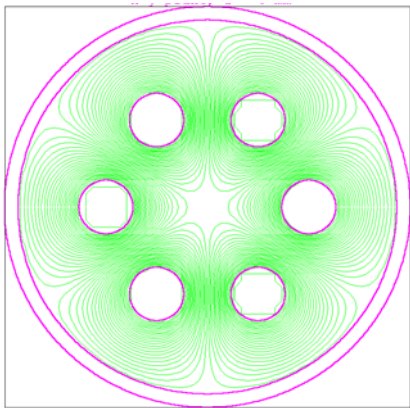
Overview

Real columns suffer from asymmetry errors caused by small mechanical imperfections during construction and alignment. Using the IMAGE-TOLERANCE software the user can compute the perturbation fields and aberrations due to tilts, misalignments and ellipticities in the electrodes or cathodes, to ensure that the system will perform in accordance with its design specifications. The IMAGE-TOLERANCE software allows the combination of aberrations and coulomb interactions to be computed and plotted for a system with asymmetry errors.

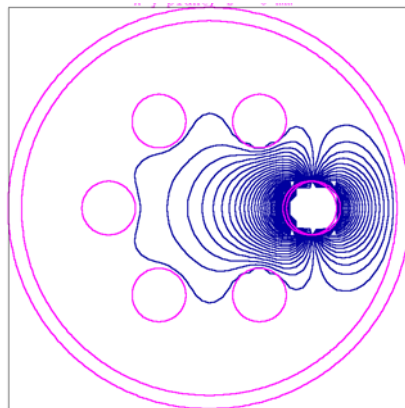
IMAGE-TOLERANCE, uses the 3D Field software to compute two sets of potential distributions for each perturbed optical element – an ideal distribution for the perfectly constructed lens, and a perturbed potential distribution for the lens with asymmetry errors. From these distributions, IMAGE-TOLERANCE extracts the asymmetry fields along the optical axis for any size of asymmetry error (assuming the effects are linear).

The resulting axial asymmetry harmonics are then fitted with Hermite series and are used in the IMAGE-TOLERANCE program, along with the ideal fields of the non-perturbed elements, to compute the optical properties of the system, using a method which is analogous to that used in IMAGE. The graphical post-processing features of IMAGE-TOLERANCE are similar to those in IMAGE, where the spot shape at the object or image plane can be displayed.

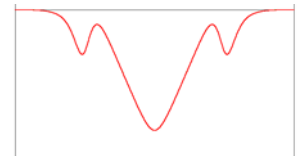
The diagrams below show the use of IMAGE-TOLERANCE in the case of a hexapoles lens with a misalignment of one of the poles. It can be seen that the level of correction obtained in the perturbed system is not as good as that obtained in the ideal system.



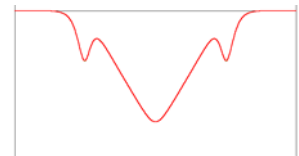
Cross-section through Ideal hexapole lens



Perturbation potentials for misaligned pole



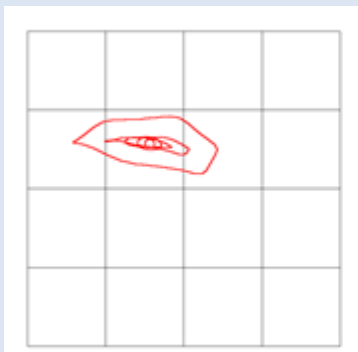
Dipole field



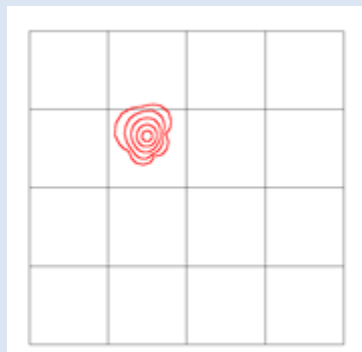
Quadrupole field

Dipole and quadrupole asymmetry fields

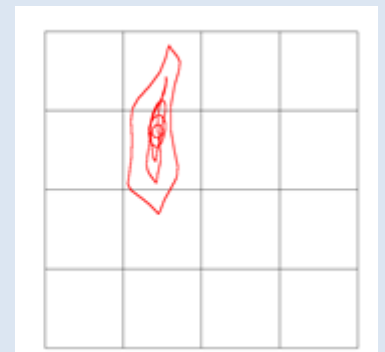
Asymmetry and perturbation fields



Under corrected



Best correction



Over corrected

Spot diagrams for various correction settings in perturbed hexapole corrector system