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Comparison between the imaging properties of two different types of electrostatic quadrupole doublet lenses

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Abstract

The comparisons between the optical properties of two types of electrostatic quadrupole lenses with the same dimensions and operation conditions are made. The optimum voltages of the electrodes which give the stigmatic image for both focusing planes with are calculated. The calculations are carried out for point-to-point focusing mode. The effects of changing the electrode shape on the optical properties of the lenses are investigated, where the magnification, electron-beam trajectories, and aberration figures are studied, and the comparisons are made. The effects of variation the object and image positions with respect to lens are studied and the comparison between the results for the two lens systems is done. The results show that the electrode shape of the lens play important role in the imaging properties of the electrostatic quadrupole doublet lens systems, especially in the aberrations figures at the image plane. The b-type electrostatic quadrupole doublet lens system gives the best imaging properties in comparison with a-type.

Keywords: electrostatic lens, electrostatic quadrupole doublet lenses, charged particles optics, SIMION, optimization, aberration

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