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Aberration reduction in electrostatic lenses[1] J.P.S. FITZGERALD, R.C. WORD, R. KOENENKAMP, Portland State University — Chromatic and spherical aberration strongly limit the resolution in electron microscopes. The objective lens is often the largest contributer to the overall aberration, so it is useful to find a minimum aberration design. The thin lens regime is a suitable approximation for objective lenses in focused-ion-beam and photoemission electron microscopes, greatly simplifying the formulas for the chromatic and spherical aberration coefficients of an electrostatic lens. The simplified expressions have explicit factors of magnification and object distance, which are typically constrained quantities. The remainder of the aberration expression can be minimized by adjusting the shape of the lens. Through this approach, we arrive at a lens geometry with the minimum spherical and chromatic aberration. We compare the results of the optimization to a numerical ray-tracing computation, and find good agreement.

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