

Composite modified Luneburg model of human eye lens

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Abstract

A new lens model based on the gradient-index Luneburg lens and composed of two oblate half spheroids of different curvatures is presented. The spherically symmetric Luneburg lens is modified to create continuous isoindicial contours and to incorporate curvatures that are similar to those found in a human lens. The imaging capabilities of the model and the changes in the gradient index profile are tested for five object distances, for a fixed geometry and for a fixed image distance. The central refractive index decreases with decreasing object distance. This indicates that in order to focus at the same image distance as is required in the eye, a decrease in refractive power is needed for rays from closer objects that meet the lens surface at steeper angles compared to rays from more distant objects. This ensures a highly focused image with no spherical aberration.