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FRESNEL LENS SOLAR CONCENTRATOR DESIGN BASED ON GEOMETRIC OPTICS AND BLACKBODY RADIATION EQUATIONS

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Abstract

Fresnel lenses have been used for years as solar concentrators in a variety of applications. Several variables effect the final design of these lenses including: lens diameter, image spot distance from the lens, and bandwidth focused in the image spot. Defining the image spot as the geometrical optics circle of least confusion and applying blackbody radiation equations the spot energy distribution can be determined. These equations are used to design a fresnel lens to produce maximum flux for a given spot size, lens diameter, and image distance. This approach results in significant increases in solar efficiency over traditional single wavelength designs.

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