

Abstract

A number of linear focusing devices have been investigated in detail. The shapes of the devices studied are as follows: the parabola, the ellipse, the circle, the hyperbola, the catenary, and the heavy elastica.

The variation of the concentration with the maximum surface slope of each type of reflector for light parallel, and at oblique angles to its axis of symmetry was analyzed. It was discovered that the parabola was superior for concentrating on-axis radiation while the catenary performed best in the area of off-axis radiation. Further analysis was done on the catenary in order to assess its tracking capability; the results indicate that limited tracking is possible with such a reflector.

The locus of the region of convergence of the radiation reflected from the reflector was found for reflectors of various slope sizes, while varying the angle of incidence of the radiation. The locus was found to follow a circle in all the cases examined.

Flexible reflectors based on the idea of weight distribution were analyzed and expressions for the weight distributions of a number of common curves were derived.

The concept of half reflectors was also investigated and found to be very useful.