

GEOMETRICAL DESIGN AND PERFORMANCE STUDIES OF LINEAR  
SOLAR CONCENTRATOR SYSTEMS

by

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## SUMMARY

This thesis presents the geometrical-optical design and performance studies of some linear solar concentrator systems. A bibliographic survey of the literature on linear solar concentrator systems is first made. A detailed study of the geometrical concentration characteristics of a composite parabolic trough (CPT) has been made. Some of the results have been verified by experiments. The effect of mirror assembly and receiver misalignment errors has also been discussed.

A somewhat new design method for a Fresnel reflector concentrator is proposed. The constructional parameters of the constituent mirror elements are so chosen that the receiver is uniformly illuminated and the blocking effect of a mirror element on adjacent mirror elements occurring in conventional Fresnel systems is avoided.

A compound parabolic concentrator may be used in sequence with a CPT or a Fresnel reflector concentrator resulting in two-stage concentrating systems. The results of the analysis made to evaluate the

performance of such two-stage systems have been presented.

The possibilities of using a fin receiver with a cylindrical parabolic trough concentrator and a CPT are explored. The necessary changes in the trough design to provide an optimized concentrator-receiver system within the framework of its geometrical behaviour are brought out by extensive numerical calculations. The effects of <sup>/errors</sup> concentrator pointing and receiver misalignment/are also discussed.

The thesis is concluded with an overview of some of the recent work on solar concentrators.

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