THERMAL MODELLING OF TYPICAL SOLAR COLLECTORS

by

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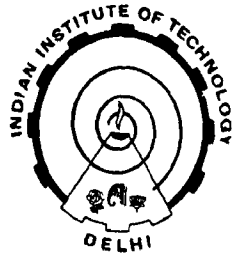

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(D. SINGH)

S U M M A R Y

The present thesis is a study of some novel designs of flat plate solar energy collectors for air and water heating purposes. The former may be used for applications in agricultural drying, space heating, domestic water heating etc., while the later is mainly used for water heating for further applications. The first part of the thesis which is devoted to the air heating collectors gives a rigorous thermal modelling of various designs. A survey of typical rating parameters has been made and the results presented in a tabular form. Some novel concepts of matrix air heating collectors namely a cylindrical porous mesh have been introduced and analysed.

Because of the intermittent nature of solar radiation, a storage system is an integral part of a solar energy system. A theory has therefore been forwarded to analyse a rock-bed storage system connected to an air heating solar energy collector. Simple systems combining the collection and storage of solar energy in one unit have also been studied from the point of view of their low cost.

The second part of the thesis deals with water heating systems. A simple theory for a spiral shape plastic water heating collectors has been developed and validated by some earlier experiments. A novel idea of using the liquid as an absorbing medium has also been studied and found to be an efficient way of increasing the thermal efficiencies of water heating systems in which the primary fluid is not used for direct applications.

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