# THERMODYNAMIC AND HEAT TRANSFER STUDIES OF SOLAR SPACE CONDITIONING SYSTEMS

BY

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# S U M M A R Y

This thesis presents some thermodynamic and heat transfer studies on solar space conditioning systems. Both active and passive methods of cooling have been proposed and analysed with special emphasis on absorption air conditioning and evaporative cooling systems. In addition to the basic thermodynamic studies on ideal cycles, thermodynamic limits on the coefficient of performance of actual cycles have been established. These limits are dependent on thermodynamic properties of the working fluids and hence provide a thermodynamic basis for the choice of working fluid for these cycles.

A novel concept of refrigerant storage within an absorption cycle has been proposed, thermodynamically analysed and shown to be feasible for continuous solar space conditioning. Some new concepts and thermodynamic cycles for space conditioning have been proposed and assessed from the point of view of their feasibility for space conditioning. In particular thermodynamic assessment and thermal modelling of dual mode absorption cycles and double effect generation absorption cycle have been presented.

Thus chapters III, IV and V form the heart of the present thesis.

In the last chapter of the thesis passive cooling of a building via evaporative cooling over the roof and variable ventilation has been presented from the point of view of reducing the cooling load to the minimum. A self consistent

periodic heat and mass transfer analysis has been developed for predicting the indoor environment in a non air conditioned building for assessing its effectiveness in solar space conditioning. It is concluded that a building indoor environment can be maintained in comfortable range of temperature by evaporative cooling and variable ventilation.

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