

Performance Analysis of Solar Flat Plate Collector with Improved Flow Configuration

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Abstract— This paper presents experimental investigation regarding performance and reliability of a newly designed flat plate solar collector. Now a days the usage of natural resources are highly in progress because artificial resources such as electricity, gasoline, fuel etc. are in declination stage and are very expensive. Solar radiation from sun is emitted that falls on earth surface this radiation is collected by using solar collectors. Solar heating systems is one of the applications of solar energy. One of the component of a solar heating system is a solar collector that consist of an absorber. Another component is reflector that consists of reflecting the sun radiation. The performance solar heating system depends on the absorber in the solar flat plate collector. Thus, this study is conducted to use a flat plate solar collector of a solar heating system as well as to evaluate in the performance of the solar collector.

Key words: Solar Flat Plate Collector

I. INTRODUCTION

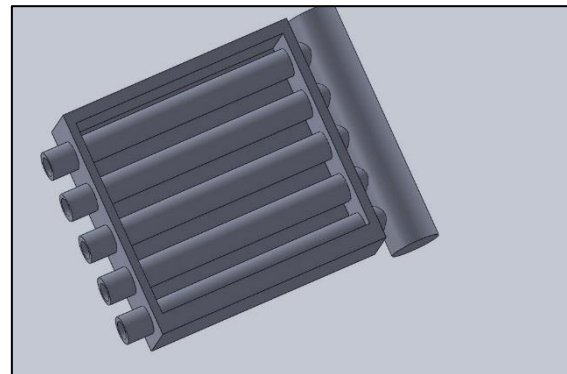
The flat plate solar collectors are basically used for the low temperature in solar thermal energy. It is used for water-heating systems in homes and solar space heating. The collectors are greatest potential of renewable energy. Solar energy is most important to daily resources in all living things. The most common one is solar electrical energy and thermal energy are solar is the renewable energy and it cannot be exhausted. Solar energy is to be an economic environment safety. Solar energy is the fast developed energy in India. Country's solar installed capacity reached 23GW as of 30June 20108. India's initiative of 100 GW of solar energy is required to fulfil be several purposes in the domestic, agricultural, industrial, and commercial sectors of the economy.

India is one of the growing huge solar energy day by day.

II. OBJECTIVES

Energy efficiency of solar flat plate collector. The collector efficiency is obtained here, without reflector as 51% and with reflector as 61% . Thus , the overall efficiency of the flat plate solar collector is increased approximately 10% by using the reflector with the collector.

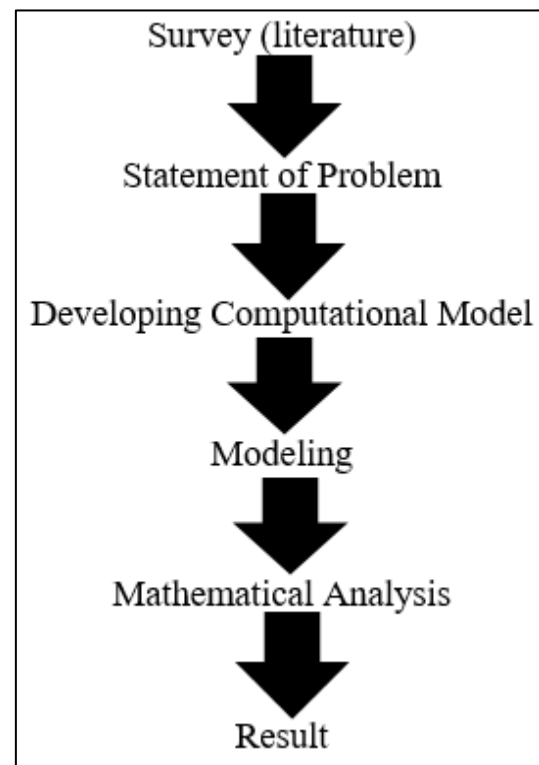
III. MODELING



IV. ADVANTAGES

- 1) Solar energy is inexhaustible source and replacement to non-renewable energy.
- 2) It can be installed anywhere and also panels places in homes.
- 3) It is not polluted by environment and not released by CO₂.
- 4) It is quite inexpensive compared to other sources of energy.

V. METHODOLOGY



VI. CONCLUSION

Flat Plate Collector with elliptical cross section absorber tube has more heat transfer rate than that of circular cross section absorber tube. Efficiency is directly proportional to flow rate. The mass flow rate has increase the efficiency of collector, also get increases. Efficiency of flat plate collector increase by changing absorber with high thermal conductivity material. Efficiency of elliptical tube is maximum as compared to other tube. Efficiency depends on intensity of sun light. Reducing the area of flat plate collector with increasing diameter of tube by reducing raiser length increase performance of collector. Sandwich type solar collector gives adequate level of efficiency which is inexpensive and easier to manufacture. Absorber with elliptical profile of plate gives optimal efficiency so it is better choice for solar collector. From the above paper it had conclude that the performance of Solar Flat plate collector can be increased by changing the geometry of absorber or absorber tube due to increase in surface area of contact between absorber and air flowing tube.

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