

A REVIEW ON RECENT DEVELOPMENT FOR PERFORMANCE ENHANCEMENT OF SOLAR WATER HEATER

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ABSTRACT

In the recent era non conventional energy is god gift for human being. Day to day the used conventional energy is adverse effect on the nature and hence the used of non conventional energy is need to be advanced. This research mainly focuses on the recent development in the field of solar water heater (SWH). The used of different techniques incorporated for improve the performance of solar water heater is mainly discussed in the research.

Keyword: - Solar Water Heater, Solar Energy, Non-Conventional Energy

1. INTRODUCTION

Solar radiation can be widely used for water heating in hot water systems, swimming pools as well as a supporting energy sources for central heating installations. Most solar water heating systems for buildings have two main parts: a solar collector and a storage tank. Solar collectors are the key component of solar-heating systems. They gather the sun's energy, transform its radiation into heat, and then transfer that heat to a fluid. Solar water heating systems can be either active or passive, but the most common are active systems. Active systems rely on pumps to move the liquid between the collector and the storage tank, while passive systems rely on gravity and the tendency for water to naturally circulate as it is heated. A typical solar water system is shown in fig.1.1.

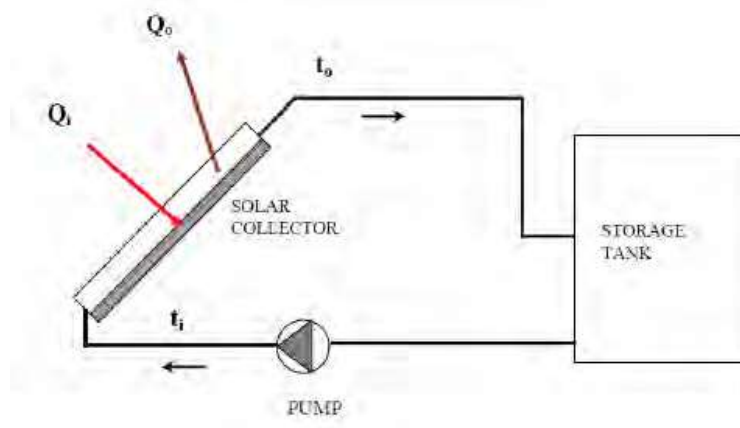


Fig.1.1. Typical Solar Water Heater

The performance of these solar system is depends on the collector. The collector absorbs maximum amount heat from sun and this energy is used for heating the water. Now a day's many compact design of solar water heater is available. The thermal performance improvement techniques like used of grooved or rough surface absorber is widely used in solar water heater [1][2].Some of researcher presented the used different types of riser or insertion in solar flat collector[11][12] [13].The design of solar flat collector is key important factor for enhancing the performance of any solar flat collector. The MATLAB tool and Fluent tools are used by researcher to analyses the flow of water inside collector [14][16].

2. LITERATURE REVIEW

The necessity for renewable energy has been accepted globally as population and the demand for fossil fuels increase. The following are some researches related with improvement in solar flat plate collector.

Sanjay Kumar Sharma et.al. [1] investigated on the experiments on V-Through Flat Plate Collector in Hot Climatic Conditions of Rajasthan. In this they have presented one case study related to this work at Jaipur. They have been observed that the V-grooved reflector will improved the performance of solar flat collector.

BAA Yousef et.al. [2] carried out the research work for the performance improvement analysis for flat plate collector with and without porous media. In this study they have used porous material in the solar flat collector for trapping maximum amount heat. The result shows that the thermal efficiency is improved by 10-12%.

Aliasghar Owla Iveli et.al. [3] presented the research work for improving the thermal efficiency of solar flat plate collector storage tank. This work concentrated on the improving the thermal energy of storage tank. The optimize design for supplying hot water for industrial section is design. The TRANSYS software is used for carried out the simulation works; also the through computational fluid dynamics (CFD), the nature of flow inside the tank is analyzed.

Prof. R. S. Shelke et.al. [4] .carried the investigation for improvement in thermal performance of solar flat collector. The performance of solar flat collector is analyzed by flow pulsation and metal blocks. The result shows that there is comparatively improvement in the thermal efficiency of solar flat collector than normal situation.

R. Herrero Martin et.al. [5] carried the works for enhancing heat transfer in the solar flat collector. In this research the helical insertion were used for improving the performance of solar lat collector. The results of study shows that the thermal efficiency of flat plate solar collector is improve to some extent compares with simple solar collector.

Labeled A et.al. [6] presented the work on the various design of solar flat solar flat plate collector. They have carried the experimental investigation on the various design of solar flat collector for drying purposes of green chillies. They have obtained the highest improvement in the thermal efficiency with trapezoidal shape collector and it is upto 77%.Overall study shows that the change in design of collector is strongly associated with its performance.

Dr. K. N. Patil et.al. [7] carried out the research work on the solar flat collector. In this study different the different types of solar flat collector used for various application is studied. The research is mainly focuses on the compacting the design of solar collector.

Fabio Struckmann [8] analyzed the solar flat collector for describing the thermal performance of solar collector. They have put the various relations for defining the performance of solar flat collector.

Ismail.N.R.[9] investigated the research work on the performance improvement the solar water heater. In this the zig zag grooves and three layers glass were used in the absorber plate for analyzing the performance of solar flat collector The results shows that the performance of flat plate shows enhance in overall conditions.

A Hai et.al. [10] presented the research work son the improvement in solar water flat plate collector heater. In this the surface properties of solar flat plate collector is analyzed, the modification is carried out on it. The surface of solar flat collector is painted with the high conductivity paint and lead electroplating is done on it, for improving the performance. The overall results show that the absorption of heat is increased by maximum 28.57% for lead coated surface.

Bukola Balaji [11] presented the research on the natural circulation solar flat plate collector. In this study the performance of solar flat collector was analyzed with different flow rate. The experimental results revealed that the flow rate is very important for the improving performance of solar water heater.

Rakesh Kumar [12] carried the investigation on the Thermal performance of integrated collector storage solar water heater with corrugated absorber surface. The thermal performance of solar water heater mainly depends on the heat transfer rate. In this research the corrugated absorber surface is used for trapping the maximum heat. The result shows enhancement in the performance of solar water heater comparatively than plain surface absorber.

Dr. A.R.Jaurkar [13] carried out experimental study on the different types of solar riser in solar water heater. The length riser of solar water heater is changed and modified for obtaining the thermal efficiency improvement. The results of study is improves in some extent.

H.Vettrivel et.al. [14] carried out investigation on the thermal performance improvement in solar flat collector using MATLAB. The mathematical model or improving the performance of solar water heater.

L.M. Ayompe et.al. [15] carried out analysis of the thermal performance of a solar water heating system with flat plate collectors in temperature climate. The thermal performance of flat plate collector is analyzed for one year with different climatic temperature; the result shows that average daily collector efficiency varied from 38.2% in July to 53.9% in February while the system efficiency varied from 31.3% in December to 44.7% in February.

Marwaan AL-Khaffajy [16] carried out the works on the optimizing heat exchanger design in flat plate integrated solar water heater. In this works ANSYS fluent software is used for simulating purpose.

K.S. Shashishekar [17] In this presented work fluid flow and heat transfer in the collector panel are studied by means of CFD analysis, also he studied parametrical analysis. In this paper Pressure drop increases in the triangular tube, more heat absorb due to content of more triangular area and collector plate.

Wenfeng Gao [18] In this paper effect of major system parameter on natural convection heat transfer are simulated. The numerical result shows that to suppress the natural convection heat loss effectively.

Wenxian Lin [19] In this paper a comprehensive parametric study on the thermal performance of cross-corrugated solar air collector. It show higher collective efficiency and emissivity of thermal radiation is negligible effect.

Marco Aurelio Dos Santos Berinardes [20] In this paper two dimensional case, where the flow is laminar upto the point of transition to turbulent of flow separation, established analytical solution can be extensively found in literature.

M. Ghalambaz [21] In this paper natural convection of nanofluids over a convectively heated vertical plate embedded in a porous medium is studied mathematically by using Runge Kutta and Gauss Newton method. It shows different types of parameter used and which increase or decrease totally studied by using mathematical formulation.

Amir Hematian [22] In this paper the collector efficiency was evaluated in natural and forced convection. It shows that the collector efficiency in forced convection is lower as compared to natural convection, in addition the average air speed in forced convection are about 21% higher than the natural convection.

3. CONCLUSION

The review of the literature on solar water heater, widely investigated both analytically and experimentally by different researchers. A number of studies have been conceded in order to investigate the effect of various parameters and design of solar flat collector on the performance of solar water heater. This research presented different research and proposed changed in the design of riser for future development in solar water heater collectors.

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