



A Review of Study and Analysis of A Solar Still Distillation System with Different Parameter using the CATIA and ANSYS software

Pushpamitra Jain and Dr. Shrihar Pandey

Department of Mechanical Engineering, Ojaswini Institute of Management and Technology, Damoh (M. P.), India

ABSTRACT

Salt water contains soluble and insoluble substances, so it is not suitable for home use. Currently, the distillation process is carried out using active and efficient solar still systems. The biggest problem with inefficient solar energy is meeting the growing demand for clean water. Water is one of the most important sources of human life on Earth. Since water resources on earth are of limited use, people in rural and urban areas suffer from the use of sewage which leads to waterborne diseases. Although groundwater is available in small quantities, it must be properly treated before it can be used indoors. This study aims to perform CFD simulations for a single slope solar still and compare natural and modified solar still to obtain the best results.

KEYWORDS- Solar still; Desalination; Glass wool insulating material;

1 INTRODUCTION

Potable water production from inefficient solar energy is still too low to meet demand. To improve the yield of conventional solar distillation, the incoming water supply is preheated by combining a solar distillation unit with separate collector plates. In this review article, several parameters that affect the evaporation rate of effective solar distillation and different combined methods are presented.

The solar base still has a constant area and a fixed energy meter facing the sun, however the water temperature is detected lower and so the distillate remains lower. In increasing water temperature, surface area takes on essential work, so scales can even be combined with solar energy to increase surface area, and thus increase water temperature.

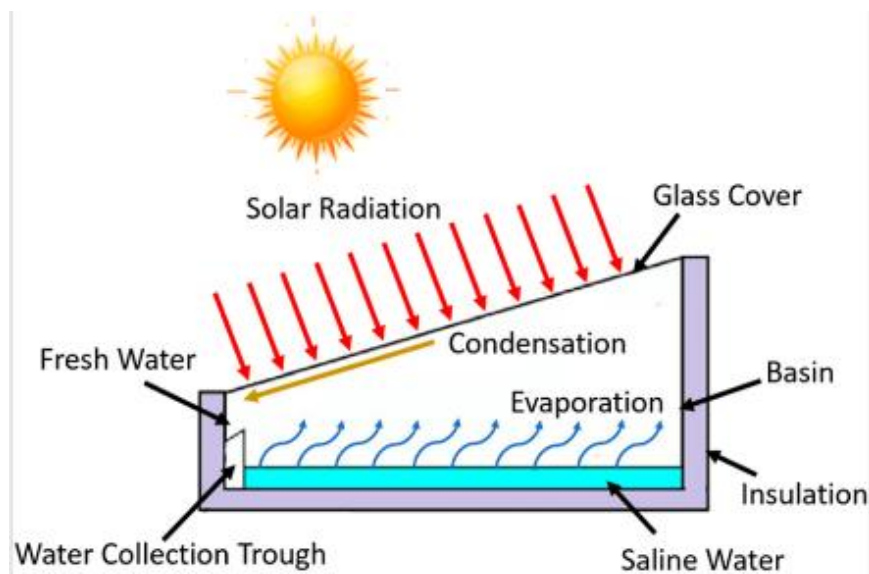


Figure 1 Diagram of solar still

In addition to an efficient distillation system, forced convection technology can be incorporated to increase fresh water production by lowering the exhaust temperature. Furthermore, it has been determined that clean water can be improved into an efficient desalination system by

efficiently and accurately storing thermal energy. This review will encourage researchers to identify the most effective solar distillation techniques to enhance development. This study explores the use of thermal energy storage from a concentrated solar water distillation heater.

Paraffin wax was chosen as the appropriate phase modulator and was used to store thermal energy in two separate and insulated boxes. Paraffin wax is given hot water in a stationary solar bowl. This solar energy is stored in the PCM as hidden thermal energy. The temperature switch is set before the pivot point. It is made from an aluminum bowl that is 20 cm wide and 7 cm deep. The container is covered with glass wool. The inner surface is completely painted black to absorb all types of radiation. To provide insulation to the stator, the outer surface of the device is completely covered with glass wool. The entire fixed setup is housed in a wooden case to accommodate the glass wool and provide additional insulating support and ease of handling. To prevent steam from escaping from the still, the glass door is hermetically sealed with rubber balls. Inlet and outlet pipes are provided for the basin. Since water is the working fluid, fill the bowl up to 2 cm with water. Make sure all sink vents are closed to prevent heat and steam loss through the vent. Fresh water is needed for an hour. The demand for clean water is rapidly increasing due to population growth and rapid urbanization. In addition to consumer purposes, clean water plays an important role in many industrial processes such as batteries, pharmaceuticals and research facilities.

It is generally believed to be the process of turning salty or polluted water into potable water using thermal energy. Solar energy is the perfect solution to fuel the refining process, in addition to being ecologically correct, free and accessible in large quantities all over the planet. Among all other brackish water purification methods, solar desalination (SD) stands out. Solar energy is still widely used as part of the SD process, but the efficiency and cost-effectiveness of solar energy is still low compared to other refining procedures.

2 LITERATURE REVIEW

Bhupendra Gupta (2017) Solar observation and comparison with conventional cleaning and fluid flow recovery systems on glass (wet) and nanoparticles (copper oxide) in a watershed. The solar thermal treatment method is the best method to produce potable water at low cost. **Bhupendra Gupta (2016)** Revamped, revamped and simulated solar system operation. A daily routine course setting is to continue to (1) paint the interior walls white and (2) stop water leakage and flow above 0.0001 kg/sec. The effectiveness of solar radiation is still being evaluated and compared with solar radiation. Daily Purified Water Production has been achieved and is still increased by 20% from the above change. **Abdullah et al. (2021)**, this in-depth study used an elaborate design to maintain the depth of water tanks using a large cylinder. Three sunsets, selected as candidates for Candidate Sun (DSS), Modified Sunset (MDSS) and Normal Sun with (CSS), were tested under environmental conditions to measure their marketing performance. DSS and MDSS were free to spin the drums in a series of DC motor driven branches. The photovoltaic system was used to eliminate energy consumption.

Hamdi Hassan et al. (2020) evaluated the performance of a single-slip capacitor in the periplate area, as well as the design, energy, economy and economic methods. Efficacy was investigated in the context of crop cleaning and in warmer climates. **Mohammad R. Salem et al. (2020)**, the etiological effects of installing the exhaust pump instead of the daily adjustment operation were examined. Different concentrations (from 16 to 35 kg/m³) and thicknesses (0 to 40 mm) of saline sponges were tested at different depths (10 to 40 mm) in the vat. The result of the pump usage report in the SSDU changes the operation order, temperature and operation information, the pump group with a pressure of 16 kg/m³ produces water with higher humidity and better temperature than normal, and the pump pressure increases and its pressure decreases.

Youssef Abdel Aziz and El Melhem Mohamed El Taweel (2020) provide an alternative method that can be used to provide low purity water to people with clean water technology, advanced technology, high yield and environment. Two DSSS motion simulators 2 m long, 1 m wide and 0.20 m high on both sides were designed and installed. The plate is stamped with a 4 mm thick double stamp. The height of a large brine bottle was 1 meter, and the water in conventional wastewater was about 0.20 meters. Salt water was often transported to ponds via a floating lamp used to store large amounts of water in ponds. One of the planets is still used as a control system (CDSSS), the other adding a simple primary method and wire flow to improve the functioning of the sun. The power cord is blackened using standard toilets to prevent black spots. The inner and right walls of the vase are covered with black cloth.

Mohamed Abdel-Gaid et al. (2020) tube footage shows larger samples and condensate above the surface when compared to the same straight slope. Therefore, the pins of the pins are mainly used to increase the volume, in addition to the external capacitor used to increase the volume. In order to obtain this indication, the test function usually includes two groups: including, in the first group, the failure of using tubes instead of the rising effect of the tube sun. Picks and getting the best type of pin has been studied. **Swellam Wafa Sharshir et al. (2020)** this work aimed to find a new method to optimize solar energy (SSs) using different 3D devices to correlate the fluctuating thermal conductivity on the water surface to increase water. These three types produced (a) graphite inserts and inserts, (b) carbon foam and inserts, and (c) carbon roving and foam. Experimental operations aim to establish a new method and adapt to the conditions where heat is generated, water grows, and heat dissipation leads to SS heat. Furthermore, the effect of water depth on the variability and natural production of SS was studied.

Emad M.S. Al-Saeed (2020), metal wire mesh was used to improve the efficiency of input, dissipation and heat storage in existing pipelines. In addition, the vibrator is installed on a wire mesh that provides a powerful vibrating vibration. This vibrator is used to remove friction on the surface of soil and salt water, which increase temperature and humidity deterioration. Thermodynamic and economic research and experiments are carried out. **Datatraya c. Subedar et al. (2020)** Nanoparticles have been achieved and are very useful. The nanofluid pushes the nanoparticles under water, emitting hot water from them. The system was designed to evaluate the effect of conventional daily continuous flow (CSP) cycling combined with continuous flow pooling (PTC) using a Nanofluid. **MA Porta-Gándara et al. (2020)** solar water consumption in a single slice per day (BTSS) type was measured by mixing water. Improvement is achieved by injecting air into the bath water to build up the body, thereby increasing the amount of moisture in the soil and encouraging increased transport. In general, water production gradually increases as resistance increases. Firstly, the BTSS instrument records the temperature in the bath water, the surrounding glass in the lid and the surrounding area, and is equipped with a quick and air measuring device, as well as a thermometer for continuous measurement.

Naseer T. Alwan et al. (2020), to improve circadian type (TSS) in two phases. In the first step, a shallow layer of sunscreen increases the amount of smoke in the interior and reduces the portion of the untreated water film. Three resistance levels (0.5, 1 and 3 rpm) were tested. The second step is to use a solar collector and an external solar system (MSS) to lift the heatsink. From the analysis of the experiment results, the efficiency was increased and the speed decreased, and it was obtained that the oven speed is lower than the speed (0.5 rpm) at higher speeds. **Ahmed Al-Sebaie and Abdel-Moneim Khallaf (2019)** this work presents a deep digit numerical model of the solar pyramid that has not been tested in many previous studies. The computer program is designed to learn all the movements of the plum pyramid while the sun is present and compare them to the clock shift of solar events in the available frames. **Gurukarthik Babu Balachandran et al (2019)**, the only regular solar eclipse (SSSS), proved to be an expensive option. Solar energy is still being evaluated in terms of climate and performance of the study areas. Most climates include strong winds and indoor temperatures. The single slope living sun base has a brine-containing surface and a sloped surface suitable for glazing, which is conducive to replacing crystal clear water in fish. Thus, three were evaluated in our study, ordinary solar materials (CSS), solar energy in microabsorbent layers (MALSS), as well as solar energy in nano layers (NALSS). The three days remain the same, the angles are high, the heat is sweltering and the same to cover things up.

Abdulnabi Kabil (2019) this article discusses the use of red coated bricks to improve the production rate of water mixtures using the sun. The addition of water adds to the flexible solar system (MSS), preserving the red brick sculptures within the concrete. The absorbent is the smallest amount used during testing in a pool where the water temperature is high in 20 kg water weight at MSS. From the results, it was also found that there was a 38% improvement in water temperature. Daily weights at depths of 20, 30, 40 and 50 are taken from the BB as 3.2, 2.8, 2.7 and 2.6 kg, while the daily shift is still 6.3, 6, 5, 8 and 5.6 kg. Due to the decrease in daily water yield, the price per liter of water is normal and transforms its energy.

Kaushal et al. (2017) Extremely hot transit temperature from floating temperature above first surface to first dish, increased dripping function due to preheating food from hot waste, lowering of pool bottom and loss of sides, adding further from overheating spark plugs or cleaning. In many areas, the water table is drastically decreasing due to rising water table for rice cultivation and commercial irrigation. **Kamel Rabbi et al (2017)** this process allows a permanent solar system with welded pin blades. The test takes place in the middle of the day, the walls are placed and pulled and pulled, with the installation stopped and normal. These experiments were obtained to control the characteristic temperature (change of humidity and crystalline temperature) and the production of water of the solar system with sharp peaks. **H. Deshmukh and S. B. Thombre (2017)** In this research mode, a one-dimensional, one-dimensional energy structure was tested in the sand and benzene (thermoformed wood) method for storing items under the bed trough. An attempt was made to lower the water in the basin. And again, it turned out that the temperature of the inner glass was lower than that of the outer glass in the first 2-3 hours.

R. Samuel Hansen and K Kalidasa Murugavel (2017) A solar distillation unit produces fresh distilled water at a lower cost compared to other primary desalination methods. In the present work, new planets are generated from the sun by attaching the solar system to a solar trough and storing water in the tank to increase solar energy production. It is understood that there is a constant solar temperature, increased water flow, drinking water temperature, usage display, filament material, design and assembly are still important basic elements of energy. Among these reasons is the time of use of groundwater, which heats the infiltrated water (water without leakage). **FM Abed et al. (2017)** the application of solar energy to a water desalination system is one of the most effective solutions to the problem of pure water scarcity. Experiments and models are being developed for the design and accompanying testing of solar panels. **Z.M. Amara et al. Al (2016)** Daily data modeling and daily modeling were empirically tested from another perspective. It is difficult for people in rural areas to find clean water at low cost. Stepping into the sun is used as a possible solution to this problem. The bowl is easy and simple to make, but it is cheap due to its poor performance. Several designs were tested to increase efficiency.

S. Al-Rashidi et al. (2016), Design and response development for room state and volume optimization in a one-dimensional solar system. The bands are arranged differently on the closed glass lid to improve performance. Modeling procedures are performed to examine the maximum Nusselt number in solution. **Arun Kumar (2016)** solar energy remains one of the best solutions to solve the problem of water scarcity. The improved airflow and volume of the cave contribute to creating peace. In this study, a standard single-chamber slider adjustable on a calm day was used for test results. It also has a system that provides operational and outdoor stability. In this study, two new arrays of solar panels were made, one and a lake. In

one case, a mixer is installed in a sink to pump water into the sink. **T. Rajasinivasan. (2016)** Samples and experimental tests were performed in a fixed glass beaker. Then, the glass column is divided by the glass column into two heated (lower) and evaporated (upper) parts. The first section consists of five angled cups like pegs to raise the temperature. **AE Kabeel et al. (2016)** Good control conditions can lead to a faster increase in the amount of saline. Nowadays hot tubs and glass tubs assume connected power and the outside condenser is lower than normal. **MR Karimi Estahbanati et al. (2016)**, the effects of irradiation (IR) on the formation of single-scale solar models and hypotheses (summer and winter) were investigated. What happens to all the walls (north, south, west and east) that received the most sunlight on the water is shown and verified with model data.

Hitesh N. Panchal and Sanjay Patel (2016) was used to obtain fresh water from saline solution by a solar flower washing method called solar distillation. Thus, it had different pressure patterns (deep water, condensation of surface material, thickness and slip, solar distillation type), measurement of wind speed, temperature and radiation, flow pattern like salt water. Under normal circumstances, sunlight enters ocean water and causes water to come out, and water vapor rises above the ground due to deep moisture. Generation dependent on solar energy, strong solar energy, wind speed, outside temperature, etc. depend on the climate. **V. Velmurugan et.al (2008)**, the water filtering function of individual showers is very low. In this study, fins were attached to the bottom location of distilled water to increase the unstable water temperature. Therefore, the manufacturing rate increases. The last sample was compared with the usual type of sinker with twine and rope. The pumping rate in the water tank is maintained at 20%. Water was collected with a scale. The silly platter has been re-engineered using rivets, machines and screws to improve its production. To model water purification, several high conversion measurements were performed. The average daily production rate was high when the tools were used for cleaning.

3 GLASS WOOL INSULATING MATERIALS

Glass wool (25 mm thick) was used to make the pattern, which is a protective material made from glass fibers laid together with a binder in a wool-like texture. This process involves very small airbags in the center of the glass, and these small airbags result in high thermal insulation properties.

Gases have poor thermal conductivity properties compared to liquids and solids and are therefore good insulators when they can be confined to objects so that a large amount of heat flowing through the object is forced to flow through the gas to increase the efficiency. It comes like air, which can be broken down into tiny cells that can effectively transfer heat through natural processes.

4 PROPOSED METHODOLOGY

The floors are painted black to increase the floor's absorption, and the interior walls are also painted from the inside to give the wall more light. A water mist was used to squirt water through the glass. Both solar collectors are still covered with insulation and tape to prevent steam from the basin from entering the atmosphere. Condensation collects from inside the cup at the bottom of the bowl. Several tools have been used to measure different performances depending on the parameters. The digital thermometer measures the temperature in various modern environments such as water, steam zone, inner glass, outer glass and average temperature. Several parameters such as ambient temperature, water temperature, evaporation temperature, glass temperature, exposure to solar radiation and hourly distillate emissions were recorded at the water depth in each container.

5 CONCLUSIONS

Water is essential for the survival and development of humanity, and unfortunately, it has become scarce in many regions of the world. It is an essential ingredient for sectors such as agriculture, fisheries, energy production, and industry. The lack of potable water is a major problem found in arid and remote areas. Most of the ground water and surface water is saline, and it contains some bacteria depending on the nature of the regional geological structures and topography. This study aims to develop effective desalination equipment that increases the distilled water production rate and improves heat transfer in the evaporator. Moreover, the effects of the energy storage system, which is placed in two specific regions on the yield of the distillation process with and without energy storage, were studied. The heat exchange system provides energy for the water to be treated during the day, while the concrete part provides energy storage for the desalination evaporator during the night. The experimental test results showed that the increase of the distilled water through the heating system is very significant compared to the productivity of the conventional solar distillation.

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