International Journal for Research in Engineering Application & Management (IJREAM)
ISSN : 2454-9150 Vol-07, Issue-12, MAR 2022

Effect of Heat Transfer Characterization in Condensation in Desalination using Solar Energy

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ABSTRACT - In this work, solar collector drying tubes (ETC) are designed to design the performance of solar collectors and dryers for drying for agricultural applications. This system can be one of the alternatives to save the cost of a traditional dryer. Drying experiments were conducted between April and June continuing in 2021. During the experiments the hot and cold air temperatures in various places, the variations of humidity and ambient humidity in the drying chamber, the wind speed and the temperature were measured during the hourly tests. Form the results the system shows that forced direct convection solar drying is designed and developed with ETC which is environmentally friendly, economical and easy to handle. Dryer performance was good with the load of cluster beans.

Key Words: Heat Transfer, Condensation, Desalination.

I. INTRODUCTION

Lack of drinking water is said to be the biggest global problem in this century due to food shortages and population growth. Pollution of clean water resources (rivers, lakes and groundwater) and industrial wastes has been affected. The size of the world's water reserves is 1, 4 billion square kilometers. The islands account for 97.5% of the total volume, while fresh water also contains 2.5% of the atmosphere, ice and groundwater. This means that only 0.014% is available to humans and other organisms. Therefore, it is important to develop fresh clean water. Disposal of seawater and / or salt water is another important factor, since the basin is the only source of untouched water. In addition to the problem of low water content, processing capacity is another problem of the problem. A lot of energy is required for capture operations. It is estimated that 10 million tons of oil per year is required at 1 million m3 / day. Because of the high cost of traditional energy systems, which are also harmful to the environment, renewable energy systems (especially solar energy) are more attractive because they are used on plants that save energy. Elimination of traditional capacity for other applications, reducing environmental pollution Provides free. The source of stable and low maintenance energy.

Ally measures the amount of sunlight the sun shines on.

1.1 DESALINATION PROCESSES

A variety of stimuli have been developed, some of which are currently under investigation. The most common technologies and commercial applications can be used in two types: heat-altering components and membrane-modifying components, and, as shown in Figure 1, have two different components. In addition, there are also different technologies for freezing and ion transfer that are not being pursued. All work on renewable energy or to produce fresh water.

Various types of alcohol regulation have been developed. These can be categorized into the following two categories.

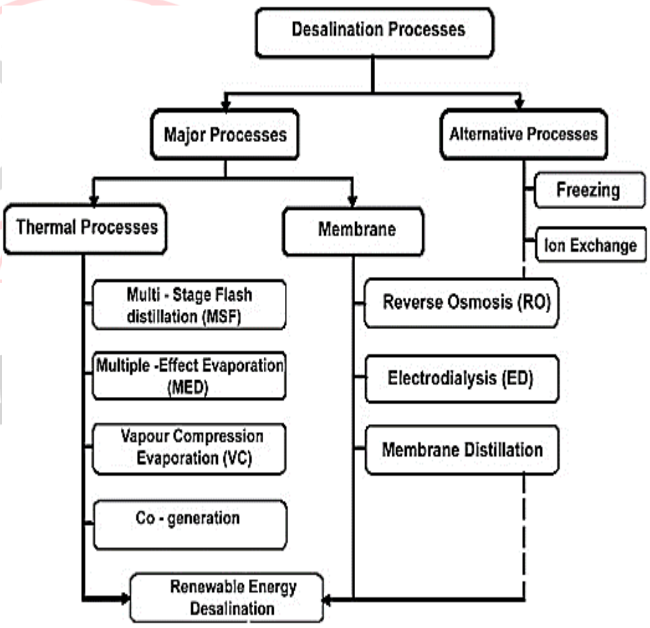

Fig 1.1 flow chart on types of desalination process

1.1.1 Phase Change or Thermal Processes

Spider systems, such as fuel oil, nuclear fuel, or solar energy can be used to evaporate water, and can be reinforced to provide fresh water. The phase cycle desalination methods described here are multistage flash, multiple steam, steam steam and harvesting.

1.1.2 Multi-stage flash (MSF) process

There are many areas in the process; in each phase the mist formed in the previous stages is heated and the

 DOI : 10.35291/2454-9150.2022.0074

ISSN : 2454-9150 Vol-07, Issue-12, MAR 2022

whiskey is heated at the same time. Thus, the difference in temperature between the hot spring and the seawater is reduced to several degrees. So, the system is going to be the most efficient albatross heat recovery. Pressure reliefs are required to control those pathways; i.e. the lower weights have a moving signal. Figure 1.1 shows the design diagram of such a system. The seawater, which is heated in various stages, enters the solar collector and is heated to a temperature directly close to the pressure of the system. When water enters the first phase through the vent, the pressure is reduced, so it heats up and swells and swells. The mist generated by the machine is then converted to remove the dissolved sedimentary water droplets, which are then sent to the hot heater when it is weakened. This process is repeated through all operations.

1.1.3 Multi-effect boiling (MEB) process

There are a number of components in the process, which are called effects. Mist from one impact will pass through the next, evaporating and absorbing some of the seawater. This process should always keep the heating coil at a pressure lower than the effect from which the steam is derived. Figure 1.2 shows the design diagram of such a system. In this system the machine switches the heat exchangers for heating, which then enters the collector or heater, enters the top of the first touch, and the heating steam raises its temperature to the temperature. Then another mist from the sun collector is used to produce evaporation. The generated mist is used as a component to heat the incoming water, and partly, as a heating element for the next benefit. Heating at direct heat is also used to heat the whiskey. This process is usually carried out on a single -phase system with minimal salt permeability through the system, thus reducing the pumping force and Building up the space

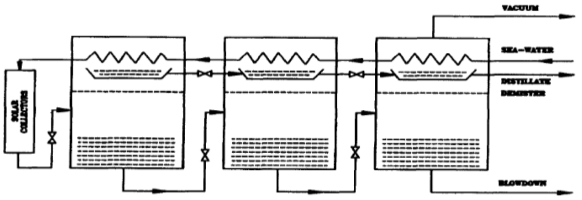

Fig. 1.1.1 Schematic diagram of multistage process

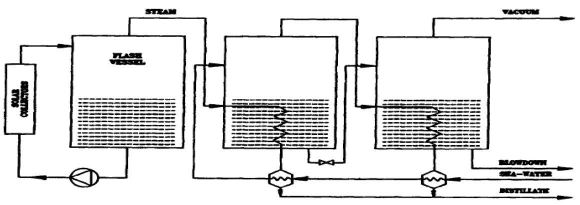

Fig.1.1.2. Schematic diagram of multi-effect boiling process

1.1.4 Vapor compression (VC) process

As the mist is compressed, it becomes more heated and pressurized. The commission -driven change is geared towards this goal. In this process, the feed is heated with steam, and some is absorbed. The fog was formed, which is shown in the figure. 1.3, which is distributed by the mechanical engine by mixing or mixing with a small amount of high voltage (thermal pressure) which is returned by a tube to the chamber, where it is pumped and shows its dormant heat to the food, so that there will be evaporation and mist produced to be collected again and the work will continue. In a vacuum pump, this is the most common, a simple light source that is needed for a start, and then the machine tool is modified to produce its own heat when there is no need for a large steam generator. There are usually 1-3 steps

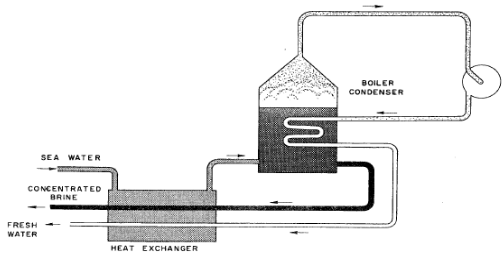

Fig. 1.1.3. Schematic diagram of a vapor compression process, adapted from Department of Water Resources

1.1.5 Freezing process

The purpose of the operation is that when the salt has cooled, a non-salt crystal is formed. Warm water enters the ice chamber (fig. 1.4) to form ice and spring mist. The ice and salt are taken to a separate chamber, the ice crystals are washed from the salts and moved to the melting chamber. The alcohol vapor produced from the ice chamber is then distributed and sent to the melting chamber, where the ice melts and the vapor subsides and becomes part of the product. The main advantage of this process is that it works at very low temperatures which significantly reduces the risk and risk of corrosion.

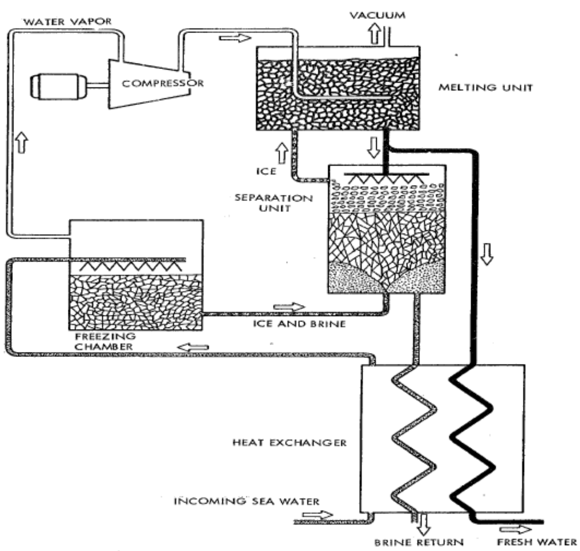

Fig. 1.1.4 Schematic diagram of freezing process

DOI : 10.35291/2454-9150.2022.0074

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1.1.6 Reverse osmosis (RO) process

Freshwater and seawater are separated into sections by a semicircular membrane, which is shown by the increase. 1.5, fresh water passes into the membrane by osmosis. If the salt solution is pressed, the osmosis function can be changed. When the pressure of salt water is higher than the actual osmotic pressure, the fresh water travels from the salt solution into the membrane next to the fresh water, leaving the salts into a fatty acid. The higher the salt content in the whiskey the higher the pressure required. As the pressure increases, a rigid membrane is required to prevent salt movement. Reverse osmosis fluid is better.

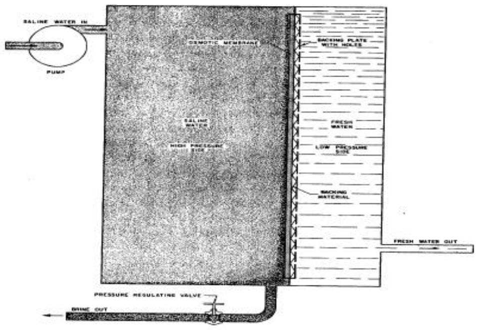

Fig. 1.1.5 Schematic diagram of reverse osmosis process

1.1.7 Electro dialysis process

The implication of this function is to reduce sea salt by transferring ions from the seawater, through the membrane, under the influence of electrical conductivity. This process combines the use of an electric motor and an optional semiconductor machine to pump salt water. Figure 1.6 shows a design diagram for such a function. The salt in salt water is in the form of ions; active ions are called anions, and active ions are called anions. As the mineral water passes through the electro-dialysis tube, the cations are attracted to the negative electrode and the ions to the positive electrode. Only a closed insulator will allow the cartridges to pass, such as sodium and calcium. Anion - filled membranes only release anions such as chloride and sulfate. In practice, many membranes stand between the electrons, creating a number of dissolved (dispersed) and aggregates (salts).

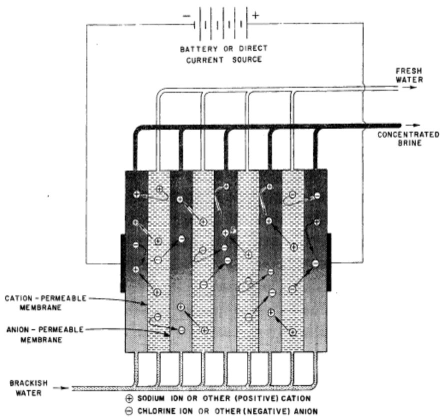

Fig. 1.1.6. Schematic diagram of electro dialysis process

1.1.8 Ion exchange

An ion exchanger is a porous bed of natural materials or synthetic resins that are capable of transferring ions in the resin and those in the mineral liquids that are attached to the bed. The beds, shown in Figure 1.7, are arranged in order so that the mineral water that passes into the cation exchanger first exits the anion exchanger. In a cation exchanger, cartridges are removed from the mineral water and hydrogen ions are added to the water. In an anion exchanger, the anions are removed from the water and a hydrogen ion is added to the water. So the compounds are removed from the salt water and become fresh water, and hydrogen and hydrogen peroxide are added to give fresh water. When ammonia is saturated with ions, they lose their ability to remove ions and die in acid and acid to restore their ion exchange properties.

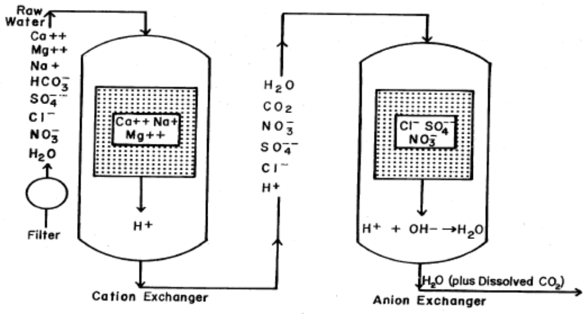

Fig. 1.1.7 Schematic diagram of ion exchange process

1.2 SOLAR DESALINATION PROCESS

Solar energy can be used to distribute the energy needed for the reduction of electric or electric current. In any case, the cost of fresh water will increase so rapidly that the plant does not consume all the energy released by the solar system; therefore, for a specific clean water requirement, the vacuum plant should be designed to consume the entire operation of the solar floor.

The solar eclipses can be categorized into two phases that require a straightforward system

1.2.1 Indirect System

The operating method of these systems is to use two separate systems, a collector for energy transfer and a plant to use energy consumption to produce fresh water. The plant can have any type of information mentioned earlier. These systems undergo a lot of clinical research and testing to improve their success. There are a number of factors that influence the choice of day collections for casual activities. Plate floor tiles are ideal for low temperature operations; these processes involve the use of vacuum methods, which are constructed with the help of vacuum pumps, spiders, or water vapor. Accelerator tube collectors ensure power even on cloudy days, and the better temperature and low stress makes it better than flat tube collectors and have better operating time. Track collectors do a better job of

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surveying track carriers, but are almost non -existent on cloudy days, because they collect a small amount of scattered debris. Parabolic actuators are required to follow a two-axis straight path that can produce temperatures above 120 ° C, which is higher than the temperature required for solar absorption. For a solar steel plant, the following factors should be considered in designing a system: the operating temperature for the system, the type of solar collection, and the heat transfer methods to work, and the type of plant to be used.

Because small heat systems can use a number of reduction parameters, it is possible to use heat-emitting diodes to control them. But because of the amount of low heat required for preparations, there are many options for sun collectors. The construction and operation of such facilities is necessary to follow the interconnected pipes, thermal heating, flow balance, maintenance, heat retention and pumping. The solar system suitable for these purposes is a water tank (SP) which includes heat storage, heat transfer, and heat transfer at low pump costs, and can also be built and operated for low cost. . The operating temperature of a solar pool can vary in the range of 30-95 ° C. The solar pool has a salt rock, a thin layer on top and a mixing layer on the bottom to hold the strong collection collected, with a plastic sheet. Between the upper and lower layers it prevents cross -linking and strong flow of growth. This allows the lake to act as a thermal trap. The scattering systems that are capable of filtering solar water sources include the multi-layer scattering-diffraction system, a multilayer scattering system, integrated osmosis, and reverse osmosis. Since the VC and RO elimination system also needs to be mechanically operated, their work with the water source requires that some of the solar energy be converted into energy (work), which is too much expensive.

The water source is ideal for driving the low temperature of multi-pressure processing for the following reasons: the temperature of the heat source supplied by the pool (60-75 ° C) is compatible with the temperature required for ME at low temperature. Yes the producers operate at a sea water temperature of 50-60 ° C with a ME cooling system that pays close attention to the variations in the power consumption and operates a stable method under the conditions.

Heat heating method. Connecting the water lake to desalinator systems has been found to be effective for dispersing seawater in a dry area, and the technology of desalinator operation is ideal, if the desalinator is made of materials that are capable of rust released by sea water.

1.2.2 Direct System

Direct systems are systems that collect heat and light components in a single device. The sun's energy is used to accurately produce the sun's darkness. It still serves as a trap for the sun's rays (the closed loop function). As the sun's rays penetrate into the light cover, the absorber absorbs and absorbs together with the salt. Eventually, the water temperature rises, the pressure increases, and the lid temperature rises. As the water flows into the surrounding air, the mist rises to the lid through natural conduction and evaporates inside the lid.

The condensate flows under the control of the agent into the collection container. The most common temperature type is the greenhouse type. There are also two types of closures: symmetrical and irregular.

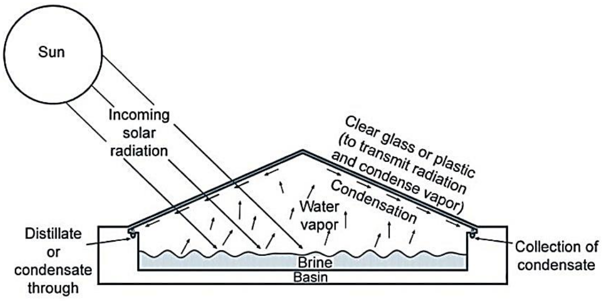

Fig. 1.2 Schematic diagram of direct system process

1.3 GREENHOUSE SOLAR STILLS

Solar lockers are very easy to build and operate. The main components of a solar greenhouse are as follows:

Form: This is where salt water is stored. The bowl should be heated from the bottom to minimize heat loss to the environment. It should be painted black or lined with black paper to make it more absorbent. The depth of the bowl may be 10-20 mm (shallow bowl) or perhaps 100 mm or more (deep bowl). Gently rub it, about 1 °, to gently drain the sharpening salt. The materials that can be used to make the mute must be strong enough to prevent salt water corrosion. It's also best to keep these resources small, long -lasting, and available in your area. Aluminum, concrete, wood-resin can be used to prevent wear, iron paint to prevent rust, and / or plastic.

Clean cover: The cover prevents leaks and keeps air from cooling the hot water. Its inner layer also serves as a supplier to increase the mist that is collected as a result. The slope of the lid, however, must be so that the force of the water in the water causes the flow to flow downwards and reaches the channels and does not return to the bowl. The ideal metal angle of the free cover is 10 and 50 ° in summer and winter. The cover is usually glass or plastic film. The glass is better because of the intensity of the light and the durability. The weakness of the glass is that it is easy to break. The plastic is lightweight, inexpensive, does not break, and is easy to handle. The main problem is the short time for decay under ultraviolet (UV) light.

Collecting waves: They are placed on the lower ends of the lid to collect light. The vessels should be made so that the length of the pitch is equal, so that the distillate flows to the lower end of the voids, and is collected as a product.

 DOI : 10.35291/2454-9150.2022.0074

In these systems, the plant is divided into two systems, a solar collector and a separation group. The solar collector can have a flat plate, exhaust tube, or converter connected to one of the types of cooling units described above that use the principle of evaporation and vaporization, for example MSF, VOC, MED and MD to enable thermal synthesis. Desalination to solar energy. Systems that use PV equipment use electricity to control RO push conditions.

Factors to choose day collections: There are many factors that influence the choice of day collections for argumentative purposes. The flat plate with extruded tube concrete collectors, is ideal for low -temperature applications that use heat to evaporate salt water, and use low pressure conditions created by vacuum pumps.

Navigator tube collectors ensure power even on cloudy days, and have a better temperature and low stress efficiency than floor plate collectors. Cylindrical path collector's work better than rebellious tube collectors, but there is no output on cloudy days when only a small fraction of the scattered debris is collected.

Parabolic actuators require accurate two-axis inspection, but can produce temperatures greater than 120 ° C, which is higher than the temperature required for the absorption of the ra. The most important parameters that are necessary are plant size, egg tenth, distance, electric field frequency, plant technology and type of plant technology available.

There are a number of innovative and electronic technologies that make water production more economically and technologically feasible than others. Some combinations are suitable for large plants, while others are suitable for small-scale applications.

Before the section is selected, the water resources must be inspected. Irrigated water is the most economical because the surface temperature is much lower (<10 000 ppm), and the energy demand is lower than previously described in the literature.

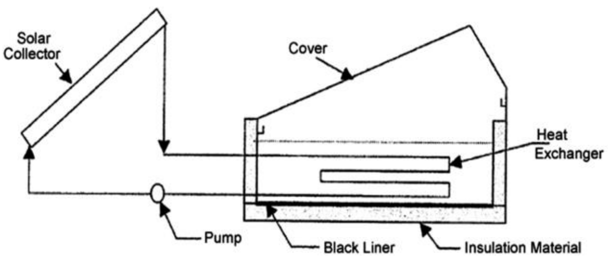

Fig. 1.3 Schematic diagram of a single solar still coupled with a solar collector

To further maximize productivity, many researchers have tried to combine the same or multiple activities with day collectors.

Combining more than one daily with daily collection panels will increase energy by using heat dissipating all the effects to bring the heat to that point.

1.3.1 Solar humidification and dehumidification

Drinking water can be obtained from salt water through a polio-killing cycle. In this process, the salt energy is stirred into the salt water and the subsequent distribution of the moist air, usually under the pressure of the air, forms a fresh water. Air has the ability to retain a large amount of water vapor, which increases the carrying capacity of the vessel to heat. Numerous deterministic studies have been performed using the irrigation system and the types of equipment used.

The principle of this evaporation process is based on the evaporation of water and the distribution of steam from the moist air. The humidified gas flows in a clockwise direction driven by the natural interaction between the condenser and the evaporator, as shown in the Show. In this example, the evaporator and the condenser are in the hot pot box as well. Seawater heats up in an evaporator and dissipates and evaporates.

The air in the precipitate flows into the salt in the evaporator and is saturated with moisture. Partial evaporation heats the rest of the salt into the evaporation phase, and now the salt is higher, and the gas is filled on the plate heat sink.

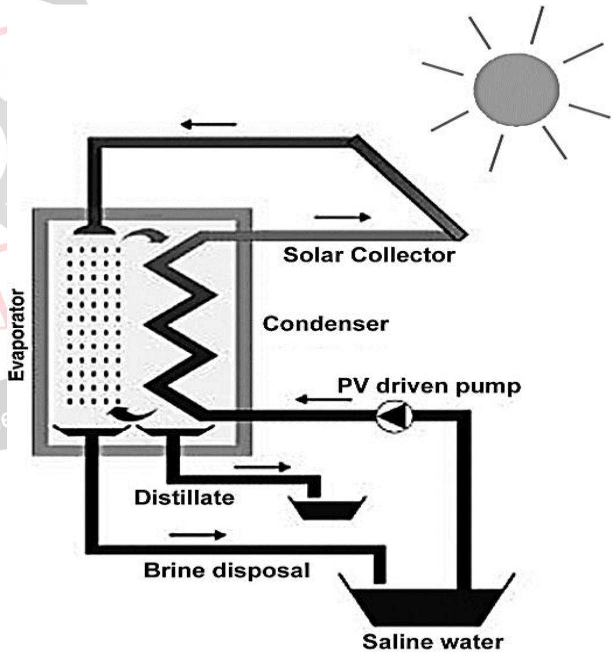

Fig. 1.3.1 Schematic diagram of the distillation system Water desalination powered by solar PV

The light flows down the plates and tricks into the collection container. The filled heat is transferred to the cold water that flows into the hot plate. Then, the temperature of the salt in the machine increases from 40 ° C to -75 ° C. In the next step, the ice is heated to the inlet temperature of the evaporator, which is between at 80 and 90 ° C. Salt of acid can also be increased at the inlet temperature of the machine by diverting the phase from the evaporation outlet to the alcohol storage port. Scattered can

 DOI : 10.35291/2454-9150.2022.0074

ISSN : 2454-9150 Vol-07, Issue-12, MAR 2022

be collected in the container and the rust goes to the alcohol container to recover some of the heat.

1.3.2 Water desalination powered by solar PV

Solar PV systems for generating electricity are popular because the government has introduced the Internal Storage system, which allows their owners to buy some or all of the electricity they generate, therefore reducing the cost time and maximizing the beauty of this technology. Solar systems convert the sun into electricity by using solar panels made from plastic and other semiconductor materials. Many solar panels are connected together to form a PV unit, which provides the required power from the required load. In addition to the PV system, power adaptive devices (e.g., amplifiers, machines and power storage devices), such as batteries, may be required to deliver power to a depleted plant. Charged controllers are used to protect the battery from high cost. Inverters are used to convert the direct current from the PV module system to convert current to loads. The rapid development of PV technology and the sharp decline in record prices of PV in the market have made it easier to afford some real estate technologies, especially for real estate and landlocked countries in developing countries.

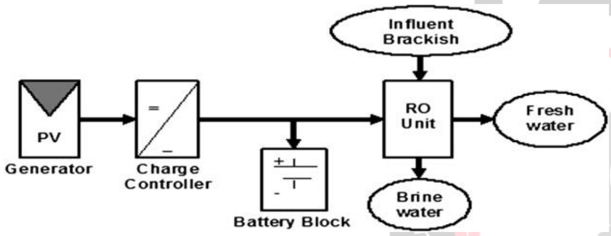

Fig. 1.3.2 Schematic diagram of RO desalination unit coupled with a PV generator

II. LITERATURE REVIEW

Ahmed, FE, Hashaikeh, R. and Hilal, N. (2019) conducted a study on "Desalination of Solar Power - Technology, Energy and Future Perspectives" followed by the following information now:

The combination of power-to-size is one of the fastest and most progressive research areas in recent years. Increased capacity for space and the simultaneous need to reduce pollution and the harmful effects of global warming have the potential to accelerate the depletion of renewable energy. In particular, solar energy is a major source of fuel for water depletion, especially due to the scarcity of fresh water and solar ecosystems that plague many regions.

In recent years, solar dissipation has been observed to be due to the fact that it is a new photothermal material, so a graphene structure and solvents / ceramics have prevented heating due to local heating. Using photovoltaic technology of solar or collectible solar can also be converted into electricity, solar energy can be used as electricity.

Kasaeian, A., Babaei, S., Jahanpanah, M., Sarrafha, H., SulaimanAlsagri, A., Ghaffarian, S. & Yan, W.-M. (2019) worked on the topic of "Solar Decontamination Systems and Humidification: A Critical Review" and summarized their findings as follows: The problem of natural water supply is spreading around the world. Rapid population growth is forcing arid and arid regions to migrate to living natural water sources. Desalination is a high-energy and high-energy process. The research section was divided into three chapters according to management methods, namely, experimentation, statistics and augmentation, crime, and economic research.

Mohammadi, K., Saghafifar, M., Ellingwood, K., and Powell, K. published a paper on "Hybrid Concentrated Solar Power (CSP) -Desalination Systems: A Review" and found the following findings which: This Hass paper was presented as a discussion and research on the artistic nature of CSP hoisting systems. The study provides an overview of the latest CSP technologies and real estate technologies, focusing on two types of hybrid systems: systems that generate fresh water and systems that generate electricity in the industry. In unity.

Chiavazzo, E., Morciano, M., Viglino, F., Fasano, M., &Asinari, P. (2018) worked on the principle of "highly effective depletion of seawater by embellishment economy and economics"and the resulting results: A comparison of the performance of solar-powered non-solar technologies (i.e., the liter of alcohol produced for each kWh of fuel in the capacity of the date) from the documents. Unlike power tools, which require mechanical moving components, the control principle of passive technology is based solely on the combination of solar -resistant hydrophilic materials and heat -resistant materials. All light, membrane depletion (MD) and reverse osmosis (RO) are combined with photovoltaic (PV) systems.

The world is moving forward to replace flower fuels with renewable energy. However, the renewable energy currently used for water reduction is estimated to be less than 1% of the world's harvest power. Due to the rising cost of fuel oil and the amount of pollution, solar energy is becoming increasingly important as a source of energy, especially as new plants have been planted as solar energy. The application of solar energy to green plants has been examined in numerous studies of the literature.

Calle et al. investigating an electrical model for a MED-solar system. Good agreement was obtained between the simulation results and the test data. Sharaf et al. check out the different changes of the two days and the different stages of the MED routines. The first method used solar energy to strengthen the MED system; the second method used the energy exerted by the Rankine cyclic cycle to validate the MED procedure. The results showed that the second method was more attractive than the first.

Joo&Kwak continued to perform performance evaluation for a wide range of MED media with a capacity of up to 3

 DOI : 10.35291/2454-9150.2022.0074

m3 / day and a heat exchanger tube. The results showed that the power ratio of the developed anchor is about 2.02.

Hu et al. performed a very old research analysis of the MED rotary electric motor machine. The results were shown to be effective in improving the energy efficiency of the heat engine by increasing the initial salt content or the number of effects in the MED.

Iaquaniello et al. He has developed a unique approach to the direct integration of solar energy alongside MED and RO radiation requirements. The results showed that the reduction with solar energy systems through such a combination can be managed continuously, and is an effective way to reduce water costs.

Andrés-Mañas et al. a review and simulation analysis was carried out for the seawater settlement. The amount of simulated water generated per year is between 41.7 and 70.5 m3.

Hartwig and Sebitosi investigated the efficiency and design of a sun -operated MED system. In addition, a simulation was developed to predict the depletion of fresh water.

Sharaf et al. reviewed the continuous types of MED attack systems supported by solar energy. The results showed that a decrease in the value of the compression ratio and an increase in evaporators, reduce energy consumption, solar energy and economic-efficiency costs.

Calise et al. inspect a solar system that generates electricity, heat energy, heating energy and service water. The results of the economic analysis were similar to similar systems.

Liet al. Preliminary research on solar detoxification will be discussed, followed by discussions on sun -assisted detoxification options and the many possible combinations. They concluded that solar radiation is the best option for future radiation systems and reduces costs for solar systems and the development of new solar technologies, as well as accurate collection and modeling of radiation records. a-ra.

Mohammadiet al. it provided an in -depth insight into the state of the art of most modern sculptures that are sharpened to defy the sun. The study showed that there are many ways to combine solar energy with plant growth.

Alhaj et al. he researched when we read the literature on electronic MED, which highlights the major weaknesses of the research that need to be considered.

Mabrouk et al designed and modeled the parabolic collector MED system. The study concluded that it is possible to reduce the capital cost for groundwater by using a cold-wind machine.

Iaquaniello et al conducted a technical and economic study of a solar-controlled MED-RO system that generates wastewater and electricity. The water trapped by the hybrid system has a price less than 1.23 / m3.

Askari and Ameri modeled the Fresnel collector's line work list that was integrated into the MED system. Technical and economic analysis of the plant was carried out under all conditions. The findings showed that the lowest price for water and the lowest daily pass rate were met.

Hamed et al. an experimental study was conducted to drive the operation of a heat sink machine driven by a Fresnel line collector. The 55,737 m2 solar area was found to require 13.6 MWh of solar energy for the plant.

Alhaj et al reported an enhanced-scale MED study by a Fresnel line collector. The results showed that the equivalent mechanical capacity of an 8 kWh / m3 system is 59% less than the capacity of current commercial MED systems with thermal gas pressure.

Guoa et al proposed an innovative scheme of the MED spray extraction system, in which a spray pump tank was used to completely break down the seawater extraction for water and salt. The results showed that a high evaporation efficiency of 99.86% can be achieved with a spray - repellent tank.

Sharan et al. test. For the proposed plants, Yanbu in Saudi Arabia reported the lowest prices for distillate and electricity installation. The cost of availability for the RO system was 16% higher than the efficiency performed by the integrated MED. Xue et al MED developed the low temperature. Proposed to improve the carrying capacity of 600 MW coal - power plant. A hot pool system model was designed to investigate the high shear.

Braun &Kleffner studied MED to improve the efficiency of water management in a variety of industrial applications. The study showed that MED is a challenging technology for the kinds of challenges the industry is facing.

Cui et al. implement a summary framework of the MED-analytical approach for evaluation by using post pressure as the independent variable for determination. The results showed that MED can save nearly 50% of the energy up to 30% of the total annual costs compared to the traditional lighting post.

III. METHODOLOGY

The results of heat transfer from the tube are shown in the following sections of this work. The test sections and test areas are presented in the first section, then; thermal test results are discussed and compared with the literature. Finally, new connections for film evaporation and shrinkage are proposed, based on our test results, to suit the universal model used in the SOLMED imaging equipment.

3.1 OBJECTIVES

- Develop a statistical model for the project to model the performance of the system.
- Use the model to design a pilot scale system on the project.
- Test the water fertilizer system and compare the test findings with the theoretical findings.

 DOI : 10.35291/2454-9150.2022.0074

ISSN : 2454-9150 Vol-07, Issue-12, MAR 2022

- Loosen the seat water drain and strain the whiskey gently.
- Study and calculate the heat transfer rate based on the heat transfer ratio using a variety of models such as mathematics and experimentation.
- Describe the type of coating at the time of extraction.
- Evaluate real -world methods to make them more practical.
- Analyze the Ocean Water and study its properties and behaviors.
- Reducing Sea Water by Using Energy Saving.
- Dissolving the water extracted after dehydration using different methods comparing the results with IS: 10500-2012 is not the best method that results in good results and overall economy.

3.2 PROJECT APPROACH

A theoretical and experimental study was conducted to research the above topic and develop a useful system based on this topic. The following actions were taken:

- Thermodynamic analysis of the whole process performed. A mathematical model has been created that can be used to evaluate the performance of the system, by determining a set of linear equations from a thermodynamic model.
- Based on the results of theoretical research, experimental activities were conducted, including:
- Design, construction, equipment and repair of the test set.
- Data collection.
- Analyze the data, analyze and compare the results of theory and experiment

3.3 MATHEMATICAL MODELING

3.3.1 Heat Transfer in Condenser

Water evaporation escapes from the sea chamber to cool, although the fresh water vapor is heated by cooling, and in order for the production process to continue, the heater must be heated continuously. The transfer of heating heat to the environment is distributed by the manufacturer. So let the giver be able to give the energy he gives

$$Q_c = \mathrm{m}\left(h_{fg} + 0.68C_p(T_s - T_{if})\right)$$

However, the solitary heat for the reminder and the second time to the right of the equation above the heat is converted from the micro. fgh

This amount of heat is transferred through the coating film, then passes through the lubricating wall and is transferred to the environment by condensing (if we forget the organic matter).

The applied heat transfer coefficient should be very large compared to the free heat transfer coefficient of the outer surface of the generator. Because the beam speed is low, and the reduction rate is low, the condensate flows as a very thin film contained in the tube. It flows and rotates in the long bar direction at the bottom of the tube. For sentences with 000,30Re <, the film transfer heat transfer ratio is given to

$$h_c = 0.725\left[1 - \frac{\theta}{\pi}\right]\left[\frac{h_{fg} g k_c^3(\rho_i - \rho_v)}{\Upsilon_l D(T_s - T_{if})}\right]^{1/4}$$

Where, if, θ the half -diameter formed by connecting the hose tube to the two ends of the water flowing downwards, is shown in the figure.

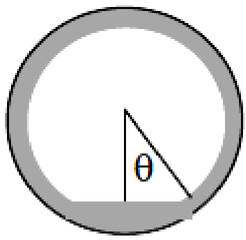

Fig.3.1 Cross section through the condenser

The properties of the film are supposed to be evaluated at the intermediate temperature between the interface, Ti, and the inner layer of the recorder, Tci, to show the heat jump on the film.

$$T_{film} = T_{ci} + 0.25(T_i - T_{ci})$$

Ti is the interface temperature calculated by assuming that all the heat transferred from the vapor to the joint, Qs-i, is transferred from the liquid film to the surface of the machine, Qi-ci. So, the interface temperature does not change with time, viz

$$\frac{dT_i}{dt} = 0$$

And

$$Q_{s-i} = Q_{i-ci}$$

Or

$$Q_c = h_c A_i (T_i - T_{ci})$$

Where Ai is the surface area of the liquid film at the interface

For heat conduction through the condenser wall,

$$Q_c = \frac{2\pi l_c k_c (T_{ci} - T_\infty)}{\ln(r_{co}/r_{ci})} = \frac{T_i - T_\infty}{\frac{1}{2\pi r_{ci} l_c h_c} + \frac{\ln(r_{co}/r_{ci})}{2\pi l_c k_c}}$$

Where Tco, rci, rco, lc, and kc are the condenser outside surface temperature, inside radius, outside radius, length, and thermal conductivity, respectively.

3.3.2 Heat Loss through condenser

For simulations with a constant heat source, solar collection, and indoor tests, the heat loss from insulation

DOI : 10.35291/2454-9150.2022.0074

ISSN : 2454-9150 Vol-07, Issue-12, MAR 2022

due to insulation was considered free, except for outdoor tests, the heating rate was wind controlled by wind speed. If the wind speed is less than 0.5 mph, the heat loss due to transmission is considered free, if the wind speed is more than 0.5 mph, the heat loss is considered to be free. Environment because of the intensity of transmission. In these two the heat transfer is omitted. It was said that heat was transferred from the bottom, sides, and top. The heat transfer ratio of each component is different. Heat loss is prevented by bringing evaporation to the machine to help create an insulated component made from polycarbonate.

The loss of heat from the bottom to the atmosphere can be calculated

$$Q_{bottom} = \frac{T_s - T_{bottom}}{t_{steel}/k_{steel}A_s + t_{ins}/k_{ins}A_s + t_{wood}/k_{wood}A_s} = \frac{T_{bottom} - T_a}{1/h_{bottom}A_s}$$

IV. EXPERIMENTATION

The main objectives of the experimental study were to investigate the effectiveness of the proposed scheme and to compare the theoretical findings with the experimental results. A test section was designed, designed, and tested.

4.1 EXPERIMENTAL SET UP

The test is the basic layout of the climb. A photograph of the outer set shown, a description of the internal assembly shown in ascending. 4.3, which includes the following important components:

Hot water side: A phenomenon of hot water side that is shown in increasing A type of electric water heater is used to provide hot water instead of solar accumulation, so that the heat is maintained at the entrance of the evaporator. A rotating pump is used to turn the hot water into a hot heater. The heat exchanger is a copper tube that is 2.4 m long and has an outer diameter of 1.27 cm. The heat transmitter was designed to lower the temperature between the inlet and outlet of 10 ° C, which indicates an increase in temperature between solar collectors.

Side Disruptions: Stakeholders can be hard -working or continuous. Sometimes batch work is used when small quantities are required. That means more effort than just constant work to manage. These evaporators are often operated to ensure constant filling, evaporation and maximum extraction. Under operating conditions, the evaporation body must be large enough to withstand the load and the heating coil will remain submerged even if the volume decreases due to evaporation. Batch design is ideal for small systems, for some enterprise products that require a lot of storage, and products that are difficult to manage. The Semi batch method can be used, where the feed is continuously fed to maintain a constant water level until the feed reaches the final draw. Fast forwarders will want to feed and deliver immediately. The evaporator of the proposed phase is operated by one of these methods. In the construction of such a section, it must be remembered that seawater is very waterless. Therefore, resources must be carefully selected. Titanium is good with some nickel and copper / nickel alloys. Stainless steel is less efficient because it is corroded especially at high temperatures.

For the purpose of this experiment, and to reduce the cost of the test installation, carbon steel was used for evaporation after applying a coating to reduce corrosion. The evaporator is a cylinder of 0.2 m2-wide, 0.2 m high and fixed with a spike cut at the top. At a height of 0.16 m from the bottom a 1 cm beam is taken to collect any condensate produced by the steam vapor in the evaporator before it reaches the machine. The lip has a wax that is large enough to allow water to flow into the normal area, which is connected to the receiver box. Given that the operating pressure is usually constant, the components of the system must be able to withstand unreasonable conditions. The frame of stainless steel is 0.254 cm thick and the bottom is 0.635 cm thick. The method for calculating these components is given in Appendix E. The evaporator provides for whiskey, through a 1.27 cm copper tube, and is supplied for the removal of direct alcohol, a 2.54 pvc base. cm. The injection and removal of pipes is a tube-by-tube heat exchanger. The evaporator contains a material to provide the required power through a closed loop heat exchanger.

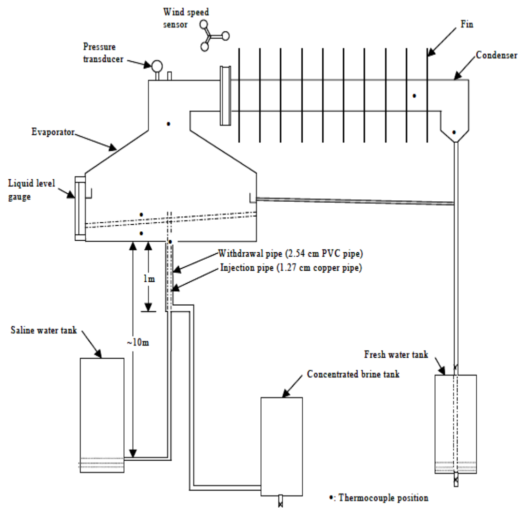

Fig. 4.1 Schematic diagram of experimental setup

Condenser side: The cutter is a 4 inch copper container 0.5 m long and 0.25 cm thick. On the sidewall, there are 10 copper tubes of diameter 25.4 cm and 0.0635 cm thick 4 cm apart. The machine was designed to dissipate the required power. The condenser is connected to the evaporator with condensers; arrange a polycarbonate section between them to form a heat block to prevent heat transfer by bringing the evaporator to the machine. At the other end, the connector

DOI : 10.35291/2454-9150.2022.0074

ISSN : 2454-9150 Vol-07, Issue-12, MAR 2022

is connected to the machine receiver via a 1.27 cm PVC pipe.

4. Auxiliary components: This process include plugs for transmission, pull -up and drive -throttle as well as connecting pipes attached with fins.

Insights

The measure, pressure and mass of cold water supplied for the measured step (for some tests). The temperature was measured using a T-type thermocouple, the pulse was weighed using a pressure transducer, and cold water was supplied using a measured rotor. The mass flow velocity was measured using a heat pump. The mass flow rate was maintained in each experiment.

V. RESULTS AND DISCUSSIONS

All tests were performed with a decrease in flow rate after waiting for the wetting of the tube section.

5.1 DROP CONDENSATION

There are two methods of staining that occur on the fabric: film shrinkage and dripping. The heat transfer coefficients for drop reduction are higher than the film coefficients. In this study, droplet reduction was initiated due to tube hydrophobicity. In addition to the experiment, a theoretical study was conducted in order to better determine the intercept method. The linear angle method was used to predict the distribution method. However, contact angles were measured at room temperature and in line with local air, but were not effective in determining the availability of large transmission systems. Understand the previous distribution method that sets the non-surface strength criterion, e.g. the difference in surface-free strength between the sharpening alcohol at warm temperature and the solid surface to predict when the film shrinkage or distribution method will fall. The criterion of free energy is not affected by the temperature measured for the contact angles. Therefore, it is more efficient and accurate to use this method, rather than the contact angle, to predict the distribution method.

Where water and σanna are a challenge and a direct force of the fabric, (N / m). The strength of a free surface (σs) in relation to its structure and chemical composition, can be calculated from contact angles and measured at temperature for strong free surface solids such as polymer.

Following the same conditions for salt water, the concentrations of white and transparent water (H_2O) and Dichloro(diiodo)methane (CCl2I2) were measured on a fresh inner surface.

Therefore, it can be concluded that the clinical method is based on the hybrid tube or a droplet. It can be said that the mixed clinical collection is more effective. In addition, the mean of the linear angle predicts the combined mean of the fall rate. Then we can conclude that the drop of sink will be strong in the tube. And that has already been said, it will remain with us in the meantime. These results are consistent with our experimental findings. Figure 5.1 shows three computerized images taken from a mirror image of the inner part of the tube.

Fig. 5.1 Drop condensation on the inner surface of the tube.

Usually between the camera and the particles, the wall of the glass column, the steam that produces evaporation, the salt water film falls, and finally the wall of the tube. As can be seen in Figure 5.1, drops appear at all points on the surface of the inner tube. They grow by spraying on their surfaces and mixing. Based on the three photos, there’s a big drop coming down soon. It grows by picking up more drops in its path. Then the surface of the inner tube is swept away by a number of moving particles. Therefore, the lower part of the tube is cleaned in the upper passages. Therefore, the particles close to the apex will be greater than the tensile strength of the barrier surface of the barrier.

5.2 OVER ALL HEAT TRANSFER COEFFICIENTS

To determine the test transfer coefficient (U_{exp}), the heat difference is calculated according to the following equation

$$Q = m_{cond} Lv$$

Where Q is the heat transfer rate (W) and m_ cond is the ring flow rate (kg / s).

$$U = \frac{Q}{A_c \Delta T}$$

U is the total heat transfer ratio (W / m2 K), Ae is the heat transfer region (m), and

$\Delta T = T_{cond} - T_{evap}$ is the temperature difference (K). Na,

Fig 5.2 shows the heat transfer separation (U_{exp}) as a method for a salt -water Reynolds (Reswf) film for temperature variations (T_{evap}). For comparison the total heat transfer ratio (U_{exp}) is expressed as the temperature difference (ΔT) for the two differential differences (T_{evap}) and Reynolds (Reswf) values in the salt water film determined in Fig. 5.3. This figure shows the error bars at all values of the heat transfer coefficient.

 DOI : 10.35291/2454-9150.2022.0074

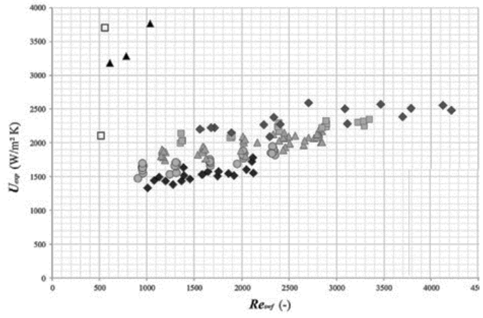

Fig. 5.2 Overall heat transfer coefficient vs. salt water film Reynolds number.

Figure 5.3 shows the heat transfer ratio (U_{exp}) as the temperature difference (ΔT) for two different workshops (T_{evap}) and Reynolds (Reswf) mass of the free film. This figure shows the error bars at all values of the heat transfer coefficient.

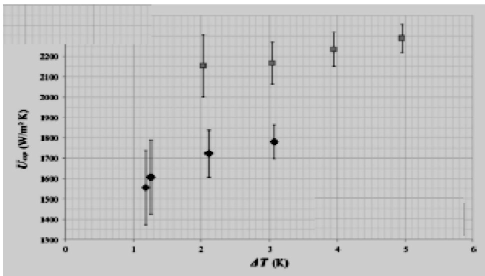

Fig. 5.3 Overall heat transfer coefficient vs. temperature difference.

As shown in Figure 5.2, the experiment was given with an increased heat transfer ratio and the Reynolds credit of the salt water film. This indicates that the flow mechanism of the falling seawater film is inefficient. There is also a parametric effect due to the temperature level: for Reynolds as many water salts, U_{exp} and T_{evap} increase. From Figure 5.3, it can be seen that the total heat transfer ratio increases with the difference in temperature. Interpretation of this behavior is possible using the heat transfer model presented later in the article. Since the results of the test are obtained by keeping the temperature drop (T_{evap}) constant, the ΔT increases, as does the temperature drop (T_{cond}). The increase in hcond and ΔT increases the heat transfer ratio (U_{exp}). The test values of the total heat transfer ratio are between 1,300 and 2,600 W / m2 K. These values are in line with the expectations.

VI. CONCLUSIONS

Based on the operating system of the solar compression system (SOLMED), a test strip was constructed with a 70 µm thick monofilament tube, and tests were conducted to determine the heat in the tube.

A thorough study of the distribution method has shown that the distribution of the droplet that occurs in the tube is maintained over a long period of time. Next, the cross - sectional coefficients were evaluated and compared with the literature. Test values range from 1,300 to 2,600 W / m2 K. The results are relative to the expected values. Although smaller, the results of this study are similar to the literature reviews, suggesting that a 25 µm-thick heat transfer plate was used, which resulted in heat transfer ratios of 3,200–3,800 W / m2 K.

REFERENCES

[1] M. Young, *the Technical Writers Handbook.* Mill Valley, CA: University Science, 1989.

[2] J.U. Duncombe, “Infrared navigation—Part I: An assessment of feasibility (Periodical style),” *IJREAM Trans. Electron Devices*, vol. ED-11, pp. 34–39, Jan. 1959.

[3] S. Chen, B. Mulgrew, and P. M. Grant, “A clustering technique for digital communications channel equalization using radial basis function networks,” *IJREAM Trans. Neural Networks*, vol. 4, pp. 570–578, Jul. 1993.

[4] R.W. Lucky, “Automatic equalization for digital communication,” *Bell Syst. Tech. J.*, vol. 44, no. 4, pp. 547–588, Apr. 1965.

[5] S.P. Bingulac, “On the compatibility of adaptive controllers (Published Conference Proceedings style),” in *Proc. 4th Annu. Allerton Conf. Circuits and Systems Theory*, New York, 1994, pp. 8–16.

[6] G.R. Faulhaber, “Design of service systems with priority reservation,” in *Conf. Rec. 1995 IJREAM Int. Conf. Communications*, pp. 3–8.

[7] W.D. Doyle, “Magnetization reversal in films with biaxial anisotropy,” in *1987 Proc. INTERMAG Conf.*, pp. 2.2-1–2.2-6.

[8] G.W. Juette and L.E. Zeffanella, “Radio noise currents n short sections on bundle conductors (Presented Conference Paper style),” presented at the IJREAM Summer power Meeting, Dallas, TX, Jun. 22–27, 1990, Paper 90 SM 690-0 PWRS.

[9] J.G. Kreifeldt, “An analysis of surface-detected EMG as an amplitude-modulated noise,” presented at the 1989 Int. Conf. Medicine and Biological Engineering, Chicago, IL.

[10] J. Williams, “Narrow-band analyzer (Thesis or Dissertation style),” Ph.D. dissertation, Dept. Elect. Eng., Harvard Univ., Cambridge, MA, 1993.

 DOI : 10.35291/2454-9150.2022.0074