



THE EFFECT OF MASS FLOW RATE ON THE HEAT TRANSFER SOLAR WATER HEATER WITH USING NANO FLUID ON CFD

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Abstract

This study was performed in an open environment in bright sunlight. The solar water heater was used for the study of the effect of sunlight on the Nano-fluids. The solar water heater was directly facing the sun. A Nano-fluid was prepared by using Nano-particles of different materials with water. The mass flow rate of the water at the inlet was 1lpm (0.017kg/s). The Nano-fluids were made to flow through the solar heater from the inlet at a temperature of about 320k. The outlet temperature of the Nano-fluid was observed in order to find the Nano-fluid with the highest temperature. The results shows to increase the efficiency and performance of solar heat pipe collector using PbO nanofluids at 0.5% fraction.

ISSN 2454-308X



Keyword: flat plate solar collector, ZnO/water nanofluids, flow rate, the outlet-inlet temperatures difference

Introduction

Solar Energy

Sun is the main source of energy in system. It offers us the energy of great potential in terms of activity the world's need. As the primary energy resources are depleting constantly, solar energy draws attention of investigators all through the world. Solar energy is one among the alternative energies that have large potential. It's estimated that the earth receives close to 1000W/m² quantity of solar irradiation during a day. The radiation incident on the Earth's surface is comprised of two kinds of radiation – beam and diffuse, go inside the wavelengths from the ultraviolet to the infrared (300 to 200 nm), that's characterized by a mean solar surface temperature of approximately 6000°K. The number of this solar power that is intercepted is 5000 times larger than the sum of all totally different inputs – terrestrial nuclear, energy and gravitative energies, and lunar gravitational energy. to place this into perspective, if the energy created by 25 acres of the surface of the sun were harvested, there would be enough energy to provide this energy demand of the world (Bouska, 2004).

When solar radiation incident on a surface then a number of this radiation is absorbed and in turn, increase the temperature of the surface. Because the temperature of the body will increase, the surface loses heat at an increasing rate to the environment. Steady-state is reached once the speed of the solar heat gain is balanced by the speed of heat loss to the close surroundings. The full energy received from the sun, per unit time, on a surface of unit area kept at right angles to the radiation, in universe; just exterior the earth's atmosphere is thought as solar constant. The value of the solar constant is concerning 1350 w/m².

Extraterrestrial radiation is that the solar radiation that falls on a surface traditional to the rays of the sun outside the atmosphere of the planet. This extraterrestrial radiation at the mean earth-sun distance is called the rate. As a result of the extraterrestrial radiation passes through the atmosphere, a part of its mirrored back to space, part is absorbed by air and water vapour, and a few is scattered. The solar radiation that reaches the surface of the world is thought as beam (direct) radiation, and also the scattered radiation that reaches the surface from the sky is thought as sky diffuse radiation (Bouska, 2004).

Solar Energy Collector