



EXPERIMENTAL STUDY OF NATURAL FLOW FLAT PLATE SOLAR WATER HEATER IN BASRA CITY

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ABSTRACT

Using solar energy for heating, cooking, desalination, electric generation and other human community requirements represents the best solution for two important world challenges, which are fossil fuel resources depletion and pollution. In this study, an experimental study for heating water by solar energy is performed at Basra city climate in Iraq. The city is located at Longitude: 47.78° and Latitude: 30.508°. The natural flow flat plate heater is directed towards the south with an angle of 30° with the horizontal. Tests for the solar water heater are implemented for five consecutive days from the month of July during the year 2021. For the present solar water heater, maximum temperature of the stored water was 48 °C, while the maximum measured temperature of the water leaving the collector is 85.9 °C. The total pressure drop was calculated and it is found that the pressure drop in the collector constitutes approximately 25 % of the total pressure that causes the circulation. The maximum natural flow hot water rate is predicted to be 14*10⁻⁴ kg/s. The maximum efficiency of the solar heater is expected to be 60 %.



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1. INTRODUCTION

Over the years, many researchers have focused their efforts on improving heat transfer (Abood et al., 2024; Abood, et al., 2023; Yaseen et al. 2024; Yaseen et al., 2022). On the other hand, the dwindling reserves of fossil fuels and the environmental pollution stemming from their combustion have spurred a quest for clean and sustainable energy alternatives (Majeed & Majeed 2022, 2024). Solar energy represents one of the most important available of renewable energy source (Majeed, 2023). The use of solar energy for the purpose of water heating

is a widespread field and has been studied in many articles (Majeed et al., 2015).

(Ong, 1976) performed a theoretical model for evaluating the natural flow solar water heater. The numerical method was used for the prediction of temperature through the heating system. Validation of the theoretical model predictions with experimental results indicated a good agreement. Morrison et al. (2005) presented a numerical and experimental investigation of the evacuated tube solar water heater. A single full-scale evacuated tube with an inclination of 45° and coupled to

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