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MEAN FLUID TEMPERATURE OF THE DOUBLE EXPOSURE AND THE CONVENTIONAL FLAT-PLATE WATER SOLAR COLLECTORS - EXPERIMENTAL RESULTS

Abstract: *In this paper the results of the experimental testing of the double exposure flat-plate (DFPC) and the conventional flat-plate (FPC) water solar collectors are presented. The results are related to the mean fluid temperatures of these two solar collectors. The DFPC is a solar collector which can absorb solar irradiation by upper as well as lower absorber surface (LAS). Absorption from lower surface is enabled by application of a flat-plate reflector. The reflector is placed below and in parallel with the collector. In this paper the experimental resuts for 20 August, 04 September and 04 October of 2012 are presented. The maximum absolute difference between temperatures $T_{d,fm}$ (DFPC) and $T_{k,fm}$ (FPC) was in the morning (2.17°C) and afternoon (1.87°C), in the periods of the maximum achieved irradiation of the LAS.*
Keywords: *solar collector, experiment*

1. INTRODUCTION

A double exposure flat-plate solar collector (DEFPC) is a solar collector which can absorb solar radiation simultaneously from both its upper and lower absorber surfaces (LAS). Absorption of irradiation from the LAS is accomplished using a flat-plate reflecting surface (reflector) placed below the collector. To enable absorption from the LAS it is necessary beside the reflector that insulation in lower part of the collector box be removed and the lower surface of the collector box replaced with glazing. On the other side, absorption from the upper absorber surface is the same as that in the conventional flat-plate solar collector (FPC). In this paper experimental results of the testing of the DFPC and FPC are presented. The results are related to the values of their mean fluid temperatures $T_{k,fm}$ (FPC) and $T_{d,fm}$ (DFPC).

2. EXPERIMENT

On the Figure 1 the experimental installations of the tested solar collectors are presented. Both installations are located in the Laboratory of Thermodynamics and Thermotechnics of the Faculty of Engineering Kragujevac. The DEFPC and FPC were tested for different water mass flow rates and different values of the water inlet temperature from 05 August to 19 October of 2012. The water from the water supply system was used as a working fluid. Daily tests of the solar collectors were often