



OPTIMAL REFLECTOR POSITION OF A DOUBLE EXPOSURE FLAT-PLATE SOLAR COLLECTOR

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Summary: The double exposure flat-plate solar collector (DEFPC) is a solar collector that can absorb solar irradiation from its upper as well as lower absorber surface (LAS). Absorption of a solar irradiation from its LAS is achieved using flat plate reflector placed below the collector. Compared to a conventional flat-plate solar collector, the insulation of the analyzed collector, placed in the bottom of the box, is replaced by glazing. In this paper the optimal reflector positions of the DEFPC are presented. They were obtained for the optimal yearly position of the collector at 44° N Latitude (Kragujevac, Serbia) and for equal dimensions of the collector and the reflector. The range of the reflector movement during a single year as well as the optimal reflector dimensions for minimum movement, were determined, too.

Keywords: double exposure flat - plate solar collector, reflector, simulations

1. INTRODUCTION

A double exposure flat-plate solar collector (DEFPC) is a solar collector which can absorb solar irradiation 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. On the other side, absorption from the upper absorber surface is the same as that in the conventional flat-plate solar collector. To enable absorption from the LAS it is necessary beside the reflector that insulation in lower part of the collector box be replaced with glass (glazing). In this paper the optimal reflector positions of the DEFPC are presented. They were obtained by simulating the mathematical model given in [1]. This case is unique because the reflector is placed in parallel below the collector and is moveable in all three orthogonal directions, north-south, east-west and normal to the collector plane.

The optimal reflector positions were obtained for the optimal yearly position of the collector at 44° N Latitude (Kragujevac, Serbia) and for equal dimensions of the collector and the reflector (as in the experiment). The range of the reflector movement during a single year as well as the optimal reflector dimensions for minimum

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