

Design and Fabrication of a Parabolic trough Collector and Experimental Investigation of Direct Steam Production in Tehran

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Abstract : Due to the high potential of solar energy utilization in Iran, development of related technologies is of great necessity. Linear parabolic collectors are among the most common and most efficient means to harness the solar energy. The main goal of this paper is design and construction of a parabolic trough collector to produce hot water and steam in Tehran. To provide precise and practical plans, 3D models of the collector under consideration were developed using Solidworks software. This collector was designed in a way that the tilt angle can be adjusted manually. To increase concentraion ratio, a small diameter absorber tube is selected and to enhance solar absorbtion, a shape of U-tube is used. One of the outstanding properties of this collector is its simple design and use of low cost metal and plastic materials in its manufacturing procedure. The collector under consideration was installed in Shahid Beheshti University of Tehran and the values of solar irradiation, ambient temperature, wind speed and collector steam production rate were measured in different days and hours of July. Results revealed that a 1×2 m parabolic trough collector located in Tehran is able to produce steam by the rate of 300ml/s under the condition of atmospheric pressure and without using a vacuum cover over the absorber tube.

Keywords : desalination, parabolic trough collector, direct steam production, solar water heater, design and construction

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