Second Article

Solar Thermal Collector Education using Polysun Simulations Software

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2020 Transnational Engineering Education using Technology (TREET), Glasgow, United Kingdom, **pp. 1-4 (2020)**

Abstract

There are a variety of solar thermal collectors available in the market today. These collectors are typically manufactured in diverse countries and have different performance characteristics. For homeowners and commercial solar solution providers, it is important to know how these collectors will perform to ensure maximum return on investment. Therefore, engineers and technicians need to be trained into how different collectors will perform in different locations. In this article, we demonstrate how a Swiss simulations software package called Polysun can be used to accurately determine the performance of a particular system under real operating conditions. To demonstrate the accuracy of the simulations tool, we show performance comparisons with experimental results for different types of flat plate and evacuated tube solar collectors. We also show examples of exercises that can be implemented in an undergraduate course in solar thermal systems. According to our investigations, the thermal performance predicted by Polysun was in close agreement with our experimental measurements. The outcomes of our investigations can help educators make informed decisions regarding teaching solar thermal systems to undergraduates using state-of-the art simulation and visualization tools.