

## The Investigation of a New Solar Water Collector

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### Abstract

A new type of solar water heater is proposed in this work and its thermal performance is assessed theoretically and experimentally. The collector uses separated glass tube instead of integrated heat pipe. The actual area of the solar collector exhibition to solar radiation around ( $2.96 \text{ m}^2$ ), which included (20) glass tubes with a water storage tank 120 liter as main parts. The present work includes three aspects. Firstly, an experiment was conducted to test thermal performance of the new collector on November, 2014. After a daily work from 09:00 am to 16:00 pm the maximum collector efficiency could reach 66%, while the temperature of water storage tank increased by about  $25 \text{ }^\circ\text{C}$  in the end. Secondly, a theoretical analysis on the energy balance for each component of the collector was made to understand the heat transfer process inside the collector. Thirdly, heat transfer model has been developed to calculate the collector efficiency, temperatures of water, the glass tube and the absorber plate, of which the theoretical results are somewhat different with the experimental data. Probably it is caused by the large heat loss in the experiment through the test devices.