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| Title | A Comparative Performance Analysis between Serpentine-Flow Solar Water Heater and Photovoltaic Thermal Collector under Malaysian Climate Conditions | | |
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| Abstract |  |
| Solar energy has increasingly been employed for domestic and industrial water heating. Both conventional solar water heater (SWH) and photovoltaic thermal (PVT) systems suffer from the drawback of poor energy conversion efficiency. In this article, a unique parallel serpentine-flow thermal collector has been designed and developed that has been employed as an isolated SWH and also integrated with a 32-cell monocrystalline photovoltaic (PV) module. Simulation models of both SWH and PVT systems have been built in TRNSYS to study their thermal performance numerically. Thereafter, outdoor experimental investigations have been conducted under the composite climates of Malaysia. Experimental results show very good agreement with the simulation outcomes with disparity less than 2%. At the optimum flow rate, the maximum thermal efficiencies of SWH and PVT are 82.5% and 74.62%, respectively. Superior water outlet temperature was obtained with SWH. Although SWH exhibits superior thermal performance, PVT’s additional electrical output might make it preferable for several applications. | |