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Thermal Performance Investigation on Cross V-Shape Solar Air Collectors

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Abstract : Two different kinds of cross V-shape solar air collectors are designed and constructed. In the transverse cross V-shape collector, the V-shape bottom plate is along the air flow direction and the absorbing plate is perpendicular to the air flow direction. In the lengthway cross V-shape collector, the V-shape absorbing plate is along the air flow direction and the bottom plate is perpendicular to the air flow direction. Based on heat balance, the mathematical model is built to evaluate their performances. These thermal performances of the two cross V-shape solar air collectors and an extra traditional flat-plate solar air collector are characterized under various operating conditions by experiments. The experimental results agree well with the calculation values. The experimental results prove that the thermal efficiency of transverse cross V-shape collector precedes that of others. The air temperature at any point along the flow direction of the transverse cross V-shape collector is higher than that of the lengthway cross V-shape collector. For the transverse cross V-shape collector, the most effective length of flow channel is 0.9m. For the lengthway cross V-shape collector, a longer flow channel is necessary to achieve a good thermal performance.

Keywords : cross v-shape, performance, solar air collector, thermal efficiency
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