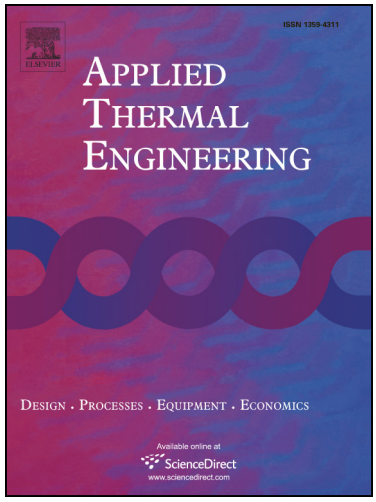

Research Paper

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Optimization of thermal design and geometrical parameters of a flat tube-fin adsorbent bed for automobile air-conditioning

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ABSTRACT

Adsorbent bed design and performance strongly affect the overall performance of adsorption systems. In the present study, an analytical model was developed to determine the optimum geometrical and thermal parameters of a flat tube-fin adsorbent bed to reach the maximum system performance. This types of heat exchangers offer substantial reduced in weight, cost, volume and thermal conductivity, which can make them a good choice for adsorbent beds in automobile applications. Results showed that the overall thermal conductance of the bed and the maximum practical specific cooling capacity increased when reducing in flat tube thickness and fin pitch as well as by increasing in fin thickness and water channel wall thickness. The specific thermal conductance increased by 2.5% when reducing the channel pitch from its design value to a minimum permissible (0.004m). From thermal parameters that have been studied, the adsorbent thermal conductivity is the most sensitive parameter to the specific thermal conductance in beds. The system performance also significantly enhanced by reducing the mass of the metal