



energies



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Design of Heat Exchangers for Heat Pump Applications

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Heat pumps (HPs) allow for providing heat without direct combustion, in both civil and industrial applications. They are very efficient systems that, by exploiting electrical energy, greatly reduce local environmental pollution and CO₂ global emissions. The fact that electricity is a partially renewable resource and because the coefficient of performance (COP) can be as high as four or more, means that HPs can be nearly carbon neutral for a full sustainable future.

The proper selection of the heat source and the correct design of the heat exchangers is crucial for attaining high HP efficiencies. Heat exchangers (also in terms of HP control strategies) are hence one of the main elements of HPs, and improving their performance enhances the effectiveness of the whole system. Both the heat transfer and pressure drop have to be taken into account for the correct sizing, especially in the case of mini- and micro-geometries, for which traditional models and correlations can not be applied. New models and measurements are required for best HPs system design, including optimization strategies for energy exploitation, temperature control, and mechanical reliability. Thus, a multidisciplinary approach of the analysis is requested and become the future challenge.



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