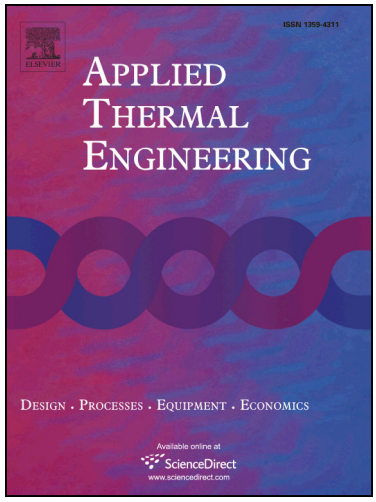

Research Paper

The optimization design and parametric study of thermoelectric radiant cooling and heating panel

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The optimization design and parametric study of thermoelectric radiant cooling and heating panel

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ABSTRACT:

Thermoelectric radiant air-conditioning (TE-RAC) system is a promising approach to implement thermoelectric technology in large-scale refrigeration system applications in future. However, no standard exists for the in situ design and the performance evaluation of thermoelectric radiant heating/cooling panel. Thus, this study aims to not only clarify the design procedure but also to share our thermal physical model and design configurations of the thermoelectric radiant panel to serve as a reference for other similar design cases. In addition, a simplified representation approach for the thermal characterization of thermoelectric panels is also discussed. The main design variables are the number of thermoelectric modules and the size of radiant panels. The inner surface transient temperature distribution of thermoelectric radiant panels is discussed, and the approaches for improving the uniformity of the inner surface temperature are proposed. The influence of cooling/heating load on the uniformity of the inner surface temperature is a slight larger than the size of the panel,