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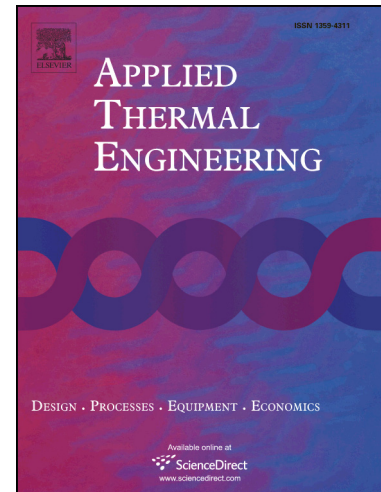
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**The lattice Boltzmann investigation of natural convection for nanofluid based battery
thermal management**

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Abstract

With the development of electric vehicles (EV), battery thermal management (BTM) has become more and more significant to maintain the temperature of batteries. For the purpose of improving cooling performance of BTM, a lattice Boltzmann (LB) model for Cu-water nanofluid based BTM is applied to simulate the natural convection. In order to ensure the accuracy of the numerical model, a validation has been implemented by solving a problem of a hollow cylinder with a uniformly distributed heat boundary. The investigations for nanofluid volume fraction of 0 to 6% and Rayleigh number of 10^3 to 10^6 have been conducted. The results showed that adding Cu nanoparticles can enhance the cooling performance and decrease the temperature difference of BTM. When Rayleigh number is 3×10^5 , the maximum temperature can be reduced by 6.5 % with 6 vol. % nanofluid. Moreover, the intensity of heat transfer was increased prominently by enhanced natural convection when Rayleigh number varies from 10^4 to 10^6 .

Keywords: battery thermal management, nanofluid, natural convection, Lattice Boltzmann

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