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Nanoparticle application for heat transfer and irreversibility analysis in an air conditioning unit

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Highlights

- Melting of NEPCM in an air heat exchanger was investigated.
- To simulate this unsteady process FVM was used.
- Irreversibility declines with rise of volume fraction.
- Charging time reduces with dispersing copper oxide.

Abstract

Charging of PCM with incorporating copper oxide nanomaterial has been modeled in current article. Unsteady simulation for reporting thermal irreversibility was performed. Nanoparticles have been dispersed into paraffin to achieve greater efficiency and reach the match between demand and supply of energy. To increase the stored energy, volume fraction of copper oxide should be increased. Outputs revealed that narrow melt layer near the inner duct has been formed in initial time and it expanded as time progressed. Melting time and volume fraction of copper oxide has reverse relation and dispersing nanoparticles make entropy generation to decline.