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Finite element method for PCM solidification in existence of CuO nanoparticles

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Abstract

In this investigation, CuO nanoparticles with various shapes are dispersed into the base fluid (water) to augment conduction mode during solidification process. This unsteady process in a complex shaped energy storage enclosure was simulated by Galerkin finite element method considering adaptive mesh. To estimate nanofluid properties, Brownian motion impact is taken into account. Results prove that greatest rate of solidification can be obtained for Platelet shape nanoparticles. Using nanoparticles is good way to accelerate charging process. Total energy enhances with rise of amplitude.

Keywords: Finite element method; Conduction heat transfer; Nanofluid; Shape of nanoparticle; Solidification.

Nomenclature

m

Shape factor

Greek symbols

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