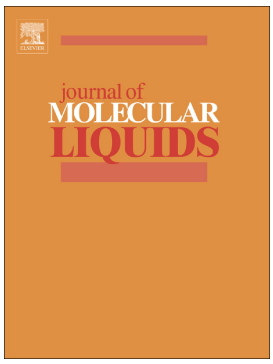


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# Numerical investigation for CuO-$H_2O$ nanofluid flow in a porous channel with magnetic field using mesoscopic method

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## Abstract

CuO-$H_2O$ nanofluid flow inside a porous channel due to magnetic field is simulated by means of Lattice Boltzmann method. Brownian motion impact added in model of nanofluid. Roles of Reynolds number $(Re)$, CuO-water nanofluid volume fraction $(\phi)$, Darcy number $(Da)$ and Hartmann number $(Ha)$ are demonstrated. Results demonstrate that convective mode improves with increase of $Da, Re$. Velocity reduces with increase of Lorentz forces but rate of heat transfer enhances with rise of Hartmann number.

**Keywords**: CuO-$H_2O$ Nanofluid; Porous channel; LBM; Lorentz forces; Forced convection.

***Nomenclature***

| | | | |
|---|---|---|---|
| $Ha$ | Hartmann number | $\rho$ | Fluid density |
| $f_k^{eq}$ | Equilibrium distribution. | $\upsilon$ | Kinematic viscosity |
| $u, v$ | x and y-directions velocities | $\phi$ | Volume fraction |
| $Nu$ | Nusselt number | $\alpha$ | Thermal diffusivity |
| $g^{eq}$ | Equilibrium internal for temperature | $\psi$ | stream function |
| $k$ | Thermal conductivity | $\tau$ | Lattice relaxation time |
| $e_\alpha$ | Discrete lattice velocity in direction | ***Subscripts*** | |

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