

عنوان مقاله:

Natural convection and radiation heat transfer from micro fin arrays under slip flow regime

محل انتشار:

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خلاصه مقاله:

In this paper, the heat transfer by natural convection and radiation from a rectangular micro-dimensional fin array is modeled for the down and up flow pattern. In micro-dimensional fin arrays, the slip velocity and the temperature jump occurs close to the solid surfaces. Maxwell's velocity slip and Smoluchowski's temperature jump boundary conditions are used to model these effects. Thereafter, the conservation of mass, momentum and energy balance equation of the flow are solved simultaneously with the heat conduction and radiation equation of the fin. The radiation heat transfer occurs between the surfaces of two adjacent fins, the fin and the base surface and the fin and the wall of the room. The steady state temperature and velocity field in the fluid are obtained from the solution of the two-dimensional transient stream function-vorticity equations, using the alternating direction implicit (ADI) scheme and marched through the transient stage, thereby, the convection and the radiation heat fluxes from the fin and the base plate, the local and the average heat transfer coefficient and Nusselt number are calculated and compared with experimental data. The effects of the spacing and the temperature difference on the heat transfer are investigated through parametric studies.

کلمات کلیدی:

Micro fin arrays, Free convection, Radiation, Slip Flow, MEMS

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