J Astrophys Aerospace Technol 2018, Volume 6
DOI: 10.4172/2329-6542-C2-021

A comparative entropy based analysis of cu and fe3o4/ methanol powell-eyring nanofluid in solar thermal collectors subjected to thermal radiation, variable thermal conductivity and impact of different nanoparticles shape

Wasim Jamshed
Penn State York, USA

The efficiency of any nanofluid based thermal solar system depends on the thermophysical properties of the operating fluids, type, and shape of nanoparticles, nanoparticles volumetric concentration in the base fluid and the geometry/length of the system in which fluid is flowing. The recent research in the field of thermal solar energy has been focused to increase the efficiency of solar thermal collector systems. In the present research, a simplified mathematical model is studied for inclusion in the thermal solar systems with the aim to improve the overall efficiency of the system. The flow of Powell-Eyring nanofluid is induced by non-uniform stretching of the porous horizontal surface with fluid occupying a space over the surface. The thermal conductivity of the nanofluid is to vary as a linear function of temperature and the thermal radiation is to travel a short distance in the optically thick nanofluid. Numerical scheme of Keller box is implemented on the system of nonlinear ordinary differential equations, which are resultant after application of similarity transformation to governing nonlinear partial differential equations. The impact of non-dimensional physical parameters appearing in the system has been observed on velocity and temperature profiles along with the entropy of the system. The velocity gradient (skin friction coefficient) and the strength of convective heat exchange (Nusselt number) are also investigated.

Wasiktk@hotmail.com