الإنتاج العلمي لمركز بحوث العلوم الهندسية

Effect of non-uniform heat rise/fall and porosity on MHD Williamson hybrid nanofluid flow over incessantly moving thin needle	
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Abstract: A novel cooling system for a hot elastic plate is considered by combined utilization of magnetic field, wavy channels and ternary nanofluid. Some applications can be found in electronic cooling, material processing and convective heat transfer control. The elastic object is placed between sinusoidal wavy channels where magnetic field of different strengths is imposed. Ternary nanofluid is used as cooling medium in both channels. Cooling performance assessment is made by various values of Reynolds number (Re, between 250 and 1000), Hartmann number of different channels (Ha, between 0 and 15), amplitude (A, between 0.05 and 0.3) and wave number (N, between 1 and 4) of corrugation, and nanoparticle loading (svf between 0 and 0.03). Entropy generation analysis is also considered. Thermal performance enhancement factor for the maximum and lowest Re configurations in the rigid and elastic object cases are 1.70 and 1.65, respectively. The amount of cooling performance improvement generated by imposing magnetic field at the highest strength is 58.5% and 80% with rigid and elastic objects, respectively. The cooling performance is improved by the wavy form amplitude; however, the wave number relation is non-monotonic. When comparing the wavy channel with the flat one, the increments of thermal performance for stiff and elastic plates are 52% and 57%. Using elastic and stiff objects with nanofluid results in increases in cooling performance of 47.2% and 55.5% when compared to the use of base fluid alone. The best thermal performance is always provided by a rigid item with wavy channels. The least amount of cooling is achieved by using an elastic plate and flat channel. The best options are to increase the magnetic field strength and amplitude of the wavy channel as thermal performance improves and entropy generation drops.

هـ_خوجه