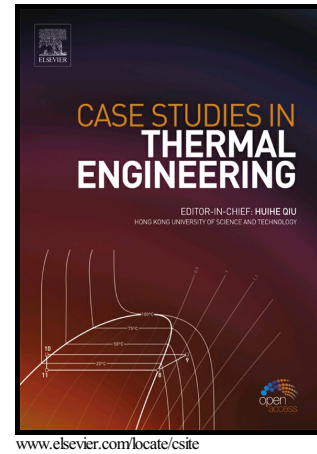


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# Magneto-Marangoni nano-boundary layer flow of water and ethylene glycol based $\gamma$ $\text{Al}_2\text{O}_3$ nanofluids with non-linear thermal radiation effects

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## Abstract

For the first time, a numerical investigation is performed to study the influences of magnetic field on Marangoni boundary layer flow of water and ethylene glycol based  $\gamma$   $\text{Al}_2\text{O}_3$  nanofluids over a flat surface in the presence of non-linear thermal radiation. Experimental based thermo-physical properties and an effective Prandtl number model for  $\gamma$   $\text{Al}_2\text{O}_3$  nanofluids are considered to analyse the Marangoni convection. To study the magnetic field effects, the electric conductivities of both nanoparticles and base fluids are taken into account. Numerical solutions of resulted equations are obtained using fourth order Runge-Kutta method with shooting technique. The combined effect of magnetic parameter with other involved parameters is discussed on velocity and temperature distributions and the local Nusselt number via graphical illustrations.

**Keywords:** Effective Prandtl number; Magnetic field; Marangoni boundary layer;  $\gamma$ - $\text{Al}_2\text{O}_3$  nanoparticles; non-linear radiation;

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