Passive control of nanoparticles on MHD Jeffrey nanofluid past a convectively heated moving plate with thermal radiation

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Abstract. A theoretical study is conducted to investigate the thermal radiation effect on boundary layer flow of magnetohydrodynamic (MHD) Jeffrey nanofluid across a moving plate with convective boundary condition. More physically acceptable model of passively controlled wall nanoparticle concentration is executed. Similarity transformation variables are utilized to transform the partial differential equations into the non-linear ordinary differential equations. An effective Runge-Kutta Fehlberg method is employed to solve the obtained equations numerically. Validation of the present results has been made with the existing studies under the limiting cases and the results are found to be in a good agreement. Numerical solutions for temperature and nanoparticle concentration fields are provided graphically for several pertinent parameters. The results indicate that the temperature profile intensifies attributable to the increasing thermal radiation parameter. Besides, the increase of Brownian motion parameter pronounces negligible effect on the temperature profile, whereas nanoparticle concentration profile declines. Moreover, increment in the thermophoresis diffusion parameter results in the intensification of the temperature and nanoparticle concentration profiles.