Nonlinear Thermal Convective Flow of a Nanofluid over a Convectively Heated Plate with Activation Energy and Binary Chemical Reaction

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In this paper, the effects of Arrhenius activation energy with binary chemical reaction on the natural convective flow of a nanofluid along a vertical plate are discussed numerically. We assumed that the relationship between the density and temperature as nonlinear. The Buongiorno’s nanofluid model, which includes the effects of Brownian motion and thermophoresis, is used in the present study. The system of governing boundary layer equations is cast into a non-dimensional form by using a suitable set of similarity variables. The resulting system of ordinary differential equations is then solved by using a Spectral Quasi Linearization Method (SQLM). To validate the code, the obtained numerical results are compared with the existing results in some special cases. The effects of various physical parameters on the non-dimensional velocity, temperature, solid volume fraction, Nusselt number and nanoparticle Sherwood number are presented and discussed.

***Keywords*:** Nonlinear convection, Activation energy, Binary chemical reaction, Convective boundary condition.