Approximate Solutions To A Spatially-Dependent Mass Dirac Equation For Modified Hylleraas Plus Eckart Potential With Yukawa Potential As A Tensor

Abstract

In presence of spin (pseudo-spin) symmetry, approximate bounded fermionic (anti-fermionic) states of the effective mass Dirac equation for modified Hylleraas plus Eckart potential within Yukawa tensor interaction have been studied by means of the parametric Nikiforov–Uvarov method. We have obtained the analytical relativistic energy eigenvalues and their corresponding normalized two-spinor components of the wave functions in closed form by making an appropriate approximation to centrifugal (pseudo-centrifugal) term for any spin–orbit quantum number κ. Some special cases for various potential models have been investigated in relativistic and nonrelativistic limit. Further, numerical results for energy eigenvalues have been obtained within the exact spin and pseudo-spin symmetries.