BOUND STATE SOLUTION OF RELATIVISTIC SPINLESS PARTICLE IN THE MULTIPARAMETER POTENTIAL

A.TAŞ AND A. HAVARE (MERSIN UNIVERSITY)
aahmet.tas@gmail.com (corresponding author)

The main purpose of this study is to find the bound state solutions of a relativistic spinless particle in the multiparameter potential reduced to the special potentials which are the Manning-Rosen, Hulthen, Eckart-Type, Rosen-Morse, Woods-Saxon, Morse, Kratzer Fues, q-Parameter Hyperbolic Pöschl-Teller and Yukawa potential. The first step for this, it has been obtained approximate analytical solutions of the Klein-Gordon equation with the multiparameter potential via the standard method by applying a Pekeris-type approximation to the centrifugal potential. At the same time, for any n and l quantum numbers, it has been calculated the bound state energy eigenvalues numerically and the corresponding eigenfunctions. As the second step, it has been investigated the special potentials, which are defined in the literature and derived from to the multiparameter potential. For these potentials, the bound states energy eigenvalues have been obtained numerically. Finally, the results obtained in the earlier studies have been compared with the ones obtained in this study and it has been seen that the results are consistent.

POSITION DEPENDENT MASS EFFECT ON BOUND AND SCATTERING STATES IN VIEW OF A MOLECULAR POTENTIAL

O. AYDOĞDU, A. TAŞ AND M. SALTI (MERSIN UNIVERSITY)
aahmet.tas@gmail.com (corresponding author)

In this study, we present analytical solution of the Klein-Gordon equation for position dependent mass with the Frost-Musulin potential which describes a diatomic molecular structures by using functional analysis method. Bound state energy eigenvalues and corresponding normalized eigenfunctions are obtained in terms of hypergeometric functions. We also reduce our results into position independent mass case in order to check the accuracy of our results. Furthermore, we explore the phase shift in the framework of position dependent/independent mass cases.