Modeling of bound states of quantum systems in a two-dimensional geometry of atomic traps

O.A. Koval[1,2] and E.A. Koval[1,3]

[1] *Bogoliubov Laboratory of Theoretical Physics, Joint Institute for Nuclear Research, Dubna, Moscow Region 141980, Russian Federation*
[2] *University Centre, Joint Institute for Nuclear Research, Dubna, Moscow Region 141980, Russian Federation*
[3] *Department of Theoretical Physics, Dubna International University for Nature, Society and Man, Dubna, Moscow Region 141980, Russian Federation*

Presenting Author: kov.oksana20@gmail.com

Numerical modeling of two-particle quantum systems in two-dimensional (2D) space is presented. The dependence of two atoms energy spectrum E on the scattering length a in the geometry of the confining trap was calculated. In the correspondent computational scheme we use conventional methods for solving the eigenvalue and the scattering problems. Agreement of numerical results with the analytical data, obtained in [1] with the zero-range potential approximation of the interatomic interaction, is illustrated by Figure 1. The calculated dependence of the energy levels of the two-particle system on the one-dimensional optical trap potential parameter and the scattering length is presented on Figure 2.

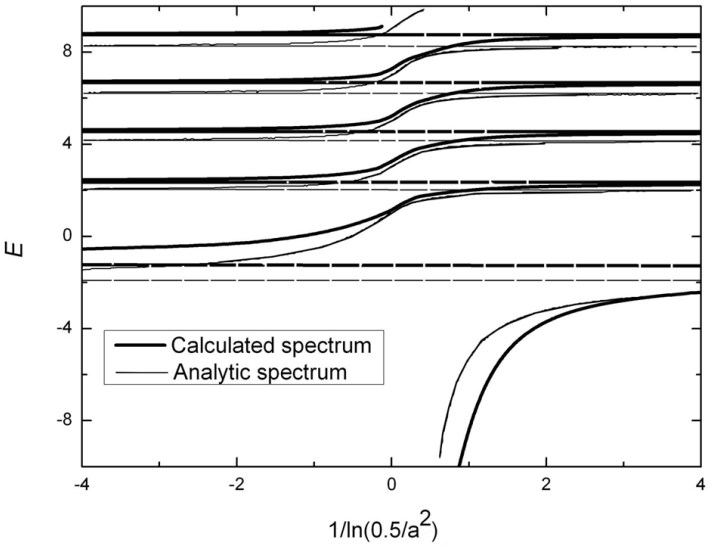

Figure 1: *The dependence of the energy spectrum E of bound states calculated data and analytical data obtained by the author in [1], on the values of the quantity $1/ln(\frac{1}{2a^2})$) , at the frequency of the oscillator $w = 1$..*

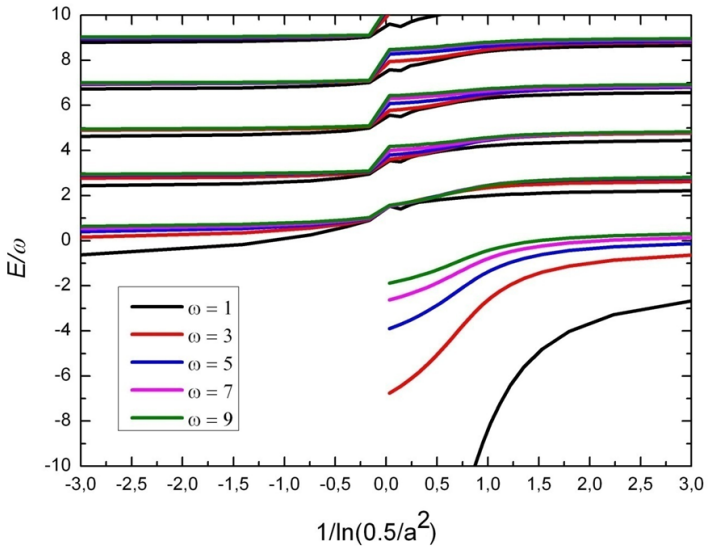

Figure 2: *The dependence of the bound state energies on the frequency of the harmonic oscillator trap potential.*

References

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