
INVESTIGATING QUANTUM GRAPH VARIATIONS AS FUNCTIONS OF TIME

A.M. Gavrikov

aaallleexxx918@gmail.com

Bauman Moscow State Technical University, Moscow, Russian Federation

Abstract

The article deals with monotonically expanding and harmonic quantum star graphs featuring bonds of variable length. The study of these structures is important for processing particle transfer in various discrete structures, for instance, in quantum and molecular wire networks, as well as for carbon nanotubes and systems simulated by quantum graphs. We solved the Schrödinger equations for time-dependent graphs. We plotted and studied average kinetic energy as a function of time. We obtained spacetime diagrams of a Gaussian wave packet for the star graph.

Keywords

Schrödinger equations, kinetic energy, discrete structures, quantum graph, boundary conditions

© Bauman Moscow State Technical University, 2017

References

- [1] Bom D. Kvantovaya teoriya [Quantum theory]. Moscow, Nauka publ., 1965, 729 p.
 - [2] Faddeev L.D., Yakubovskiy O.Ya. Lektsii po kvantovoy mekhanike dlya studentov-matematikov [Lectures on quantum mechanics for students-mathematics]. Moscow-Izhevsk, RKhD publ., 2001, 256 p.
 - [3] Dirac P.A.M. The principles of quantum mechanics. Clarendon Press, 1964, 314 p. (Russ. ed.: Printsipy kvantovoy mekhaniki. Moscow, Nauka publ., 1970, 408 p.).
 - [4] Szebehely V. Theory of orbits. The restricted problem of three bodies. New York, Academic Press, 1967, 668 p. (Russ. ed.: Teoriya orbit: ogranichennaya zadacha trekh tel. Moscow, Nauka publ., 1982, 656 p.).
 - [5] Pokornyy Yu.V., Penkin O.M., Pryadiev V.L., Borovskikh A.V., Lazarev K.P., Shabrov S.A. Differentsial'nye uravneniya na geometricheskikh grafakh [Differential equations on geometric graphs]. Moscow, Fizmatlit publ., 2004, 272 p.
 - [6] Stöckmann H.-J. Quantum chaos: an introduction. Cambridge University Press, 2007, 384 p. (Russ. ed.: Kvantovyy khaos: vvedenie. Moscow, Fizmatlit publ., 2004, 376 p.).
 - [7] Kulik p.D., Berkov A.V., Yakovlev V.P. Vvedenie v teoriyu kvantovykh vychisleniy (metody kvantovoy mekhaniki v kibernetike). Kn. 2 [Introduction to the theory of quantum calculations (quantum mechanics methods in cybernetics). Vol. 2]. Moscow, MEFHI publ., 2008, 532 p.
 - [8] Berezin F.A., Shubin M.A. Uravnenie Shredingera [Schrodinger equation]. Moscow, Izdatelstvo Moskovskogo universiteta publ., 1983, 392 p.
 - [9] Takhtadzhyan L.A., Faddeev L.D. Gamil'tonov podkhod v teorii solitonov [Hamiltonian approach to the soliton theory]. Moscow, Nauka publ., 1986, 527 p.
 - [10] Tolchennikov A.A. Spektral'nye svoystva operatora Laplasya na dekorirovannykh grafakh i na poverkhnostyakh s del'ta-potentsialami. Diss. kand. fiz.-mat. nauk [Spectral properties of Laplace operator in decorated graphs and on surfaces with delta potential. Kand. phys.-math. sci. diss.]. Moscow, MGU publ., 2009, 59 p.
 - [11] Levitan B.M., Sargsyan I.S. Operatory Shturma—Liuvillya i Diraka [Sturm-Louisville and Dirac operators]. Moscow, Nauka publ., 1988, 432 p.
-

Gavrikov A.M. — student, Department of Submersible Mechanisms and Robots, Bauman Moscow State Technical University, Moscow, Russian Federation.

Scientific advisor — Yu.Yu. Infimovskiy, Cand. Sc. (Eng.), Assoc. Professor, Department of Physics, Bauman Moscow State Technical University, Moscow, Russian Federation.
