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On the algebraic exact solution for the quantum harmonic oscillator with variable frequency

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In the last four decades the Harmonic Oscillator with Variable Frequency (HOVF) has drawn big attention as the principal model leading to squeezing states. We use algebraic methods to solve this problem for the first time in the Schrodinger picture. The solution is presented in a compact recursive form through general continuous fractions and enables calculate the final state of the system and the dynamics for any frequency function including such with jump discontinuities. In addition, we implement a numerical calculation of the solution and study the transition from a sudden change to adiabatic behavior between two frequencies.

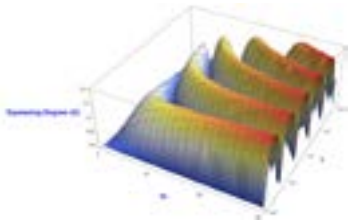

Figure: Tridimensional plot of the squeezing degree r(t), for a sudden change in the HOVF as a function of the jump η_0 and the time τ

Recent Publications

1. Ether D S et.al (2018) Double-layer force suppression between charged microspheres. Physical Review E. 97:022611.
2. Ether D S et.al (2015) Probing the casimir force with optical tweezers. Europhysics Letters 112(4):44001.

Biography

D M Tibaduiza has completed his MSc in Theoretical Physics with emphasis in Colloidal Stability and is a PhD candidate in physics at the Federal University of Rio de Janeiro (UFRJ). He is actually researching in Quantum Electrodynamics and the Dynamical Casimir Effect. He is an expert in mathematical methods applied in physics and it is a computational implementation. He has extensive experience in basic physics and mathematics education. He has two collaborations published in reputed journals and two researches that will be submitted soon.

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