Supplementary Material

Clarifying Nonstatic-Quantum-Wave Behavior Through Extending Its Analysis to the p-Quadrature Space: Interrelation Between the q- and p-Space Wave-Nonstaticities

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Previous Research Consequence (Ref. [15] in the Paper)

Here we summarize the research of Ref. [15], which belongs to the q-space wave-nonstaticity in a static environment. General types of wave functions for Fock-state waves and a Gaussian wave were established on the basis of the Schrödinger equation. Such wave functions were represented in terms of the time function $f(t)$ given in Eq. (3) in the text of the present work and showed nonstaticity (hereafter, all referred equations belong to the present work). According to the nonstaticity of waves, periodical collapse and expansion of the q-space waves appeared. It was shown, in case of the Fock states, that the emergence of the imaginary part $W_{\rm I}(t)$ in $W(t)$ that appears in the exponential factor of wave functions (see Eq. (A2) in Appendix A with Eq. (1)) is responsible for the nonstaticity in the wave. Taking notice of this consequence, the measure of nonstaticity was defined as the RMS value of the ratio $W_{\rm I}(t)/W_{\rm R}(t)$ where $W_{\rm R}(t)$ is the real part of $W(t)$. The same methodology but with different time functions was applied to the Gaussian state in quantifying its nonstaticity. It was shown that the effect of nonstaticity becomes significant as the nonstaticity measure grows.