Fractional Fourier Transformation for Quantum Mechanical Wave Functions Studied by Virtue of IWOP Technique

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Abstract: Starting from the optical fractional Fourier transform (FFT) and using the technique of integration within an ordered product of operators we establish a formalism of FFT for quantum mechanical wave functions. In doing so, the essence of FFT can be seen more clearly, and the FFT of some wave functions can be derived more directly and concisely. We also point out that different FFT integral kernels correspond to different quantum mechanical representations. They are generalized FFT. The relationship between the FFT and the rotated Wigner operator is studied by virtue of the Weyl ordered form of the Wigner operator.

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