Fractional Fourier Transform: Main Properties and Inequalities

ABSTRACT

The fractional Fourier transform is a natural generalization of the Fourier transform. In this work, we recall the definition of the fractional Fourier transform and its relation to the conventional Fourier transform. We exhibit that this relation permits one to obtain easily the main properties of the fractional Fourier transform. We investigate the sharp Hausdorff-Young inequality for the fractional Fourier transform and utilize it to build Matolcsi-Szücs inequality related to this transform. The other versions of the inequalities concerning the fractional Fourier transform is also discussed in detail. The results obtained in this paper are very significant, especially in the field of fractional differential equations.