

## Donoho-Stark's and Hardy's Uncertainty Principles for the Short-Time Quaternion Offset Linear Canonical Transform

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**Abstract :** The quaternion offset linear canonical transform (QOLCT), which is a time-shifted and frequency-modulated version of the quaternion linear canonical transform (QLCT), provides a more general framework of most existing signal processing tools. For the generalized QOLCT, the classical Heisenberg's and Lieb's uncertainty principles have been studied recently. In this paper, we first define the short-time quaternion offset linear canonical transform (ST-QOLCT) and derive its relationship with the quaternion Fourier transform (QFT). The crux of the paper lies in the generalization of several well-known uncertainty principles for the ST-QOLCT, including Donoho-Stark's uncertainty principle, Hardy's uncertainty principle, Beurling's uncertainty principle, and the logarithmic uncertainty principle.

**Keywords :** Quaternion Fourier transform, Quaternion offset linear canonical transform, short-time quaternion offset linear canonical transform, uncertainty principle

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