

國立中山大學應用數學系

學術演講

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講題：Applications of Quaternion linear canonical
transforms

時間：2015/12/21 (星期一) 16:10 ~ 17:00

地點：理學院四樓理 SC 4009-1 室

茶會：15:30 於理 SC 4010 室 (系辦公室)

摘要

Quaternion Linear canonical transforms (QLCTs) are a family of integral transforms with wide application in optical, acoustical, electromagnetic, and other wave propagation problems. The Fourier and fractional Fourier transforms are special cases of QLCTs. In this talk, we gave the uncertainty principle for hypercomplex signals in the Fourier domains to the linear canonical transform domains, giving us the tighter lower bound on the product of the effective widths of complex para-vector valued signals in the time and frequency domains. It is seen that this lower bound can be achieved by a Gaussian signal. Furthermore, we studied the hypercomplex 2D analytic signal in envelope detection problem. The analytic signal enables to extract local features from images. The extension of analytic signal of linear canonical transform domain from 1D to 2D, covering also intrinsic 2D structures, was proposed. Different approaches to the 2D quaternion Hilbert transforms are proposed that allow the calculation of the associated analytic signals, which can suppress the negative frequency components in the QLCT domains. Examples of envelope detection demonstrate the effectiveness of our approach.

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