

SEMINAR

Grupo de Análise Funcional e Aplicações Functional Analysis and Applications Group

On the generalized Wigner distribution and ambiguity function for the linear canonical transform

Lai Tien Minh

Hanoi Architectural University

Abstract

This talk introduces a new integral transform for generalizing the Wigner distribution (WD) and ambiguity function (AF) associated with the linear canonical transform (LCT), which achieves an organic unity of most known linear canonical Wigner distributions. Some useful properties of the proposed new distribution will also be disclosed. More importantly, the specific conditions for the detection performance of the proposed distribution to be better than the WD and the closed-form instantaneous cross-correlation function-type Wigner distribution (CICFWD) will also be pointed out in detail, along with illustrative examples of numerical simulation. Due to the large number of free parameters, the newly defined distribution proves to be flexible, valuable, and possesses superior efficiency in detecting linear frequency modulation (LFM) signals. Moreover, compared to the WD and CICFWD, the GWAL not only exhibits a superior output signal-to-noise ratio (SNR) but also a significant reduction in the noise of the output part. Furthermore, the applications of the new distribution in designing multiplicative filters for separating multi-component time-frequency signals in the LCT domain will also be discussed in the last part of this talk.

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