

Title: Chirp cyclostationary signal analysis in the fractional Fourier domains

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Abstract: The cyclostationary signals are widely utilized in practical applications such as in communications, radar/sonar systems, rotating machinery. However, if the receiver is relatively moving with the transmitter in communications or the rotating machinery with time-varying speed, the signals are no longer cyclostationary, but they can be modeled as generalized cyclostationary signals. In this talk, we focus on a special kind of the generalized cyclostationary signals, saying chirp cyclostationary (CCS) signals. A CCS signal is modeled as the product of a cyclostationary signal and a linear frequency modulation signal. There are quadratic polynomial phase in the signal model, which brings the quadratic polynomial phase in the second-order moment of the CCS signal. The kernel functions of the transforms in the fractional Fourier analysis have quadratic polynomial phase, which exactly match the signal model. Accordingly, the novel cyclic statistics of the CCS signals will be introduced associated with the fractional Fourier analysis in this talk. And some simulation results are present to confirm the theoretical results.