The first connection between linear modulations and continuous phase modulation (CPM) was addressed by Laurent [1]. Laurent showed that any binary non-integer single-h CPM could be presented by a superposition of Pulse Amplitude Modulation (PAM) pulses. Then, Huang et al. provided the PAM decomposition for the particular case of CPM schemes with integer modulation index [2].

In this abstract, we propose to apply the same approach given for the PAM decomposition of CPM signals to single sideband - frequency shift Keying (SSB-FSK) signal with integer/non-integer modulation indices. Originally, the SSB-FSK signal with information-carrying phase is defined as a classical CPM signal where the frequency pulse is a Lorentzian pulse truncated to a symbol duration \( L > 1 \) [3].

The complexity reduction of the Viterbi receiver is directly related to the number of PAM selected to efficiently approximate the original CPM signal for a targeted error probability \( P_e \). Hereafter, we present a flowchart for the associated algorithm used to select the number of PAM pulses. The algorithm depends on two important factors: the PAM pulses obtained from the Mean-Square approximation and the performance bounds of the maximum likelihood detector and the PAM-based receivers.

![Flowchart of the algorithm to select the number of PAM required for an SNR difference \( \alpha \) dB between the optimal MLSD receiver performance bound and the PAM-based receiver performance bound for \( P_e = 10^{-5} \).](image)

Using the previous algorithm, we were able to prove that the performance bound for the PAM-based receiver approaches the optimal MLSD performance bound with \( \alpha < 0.5 \) for the configuration 6SSB-FSK reducing the number of the needed matched filters from 64 to only 8.

**References**

