### Abstract:
A new pilot tone placing and pilot sequence design is proposed to compensate the carrier frequency offset (CFO) in OFDM systems. Unlike the conventional approach where isolated pilot tones are used, in this paper every two pilot tones are clustered as a group and these groups are equally spaced. The pilot sequence is carefully designed, of which the left hand sided pilot symbol in each cluster is antipodal with the right hand sided one. The performance in terms of the pilot channel interference ratio (CIR) can be significantly improved by the proposed pilot scheme. Theoretical analysis shows that the clustered pilot tones can give a substantially lower CFO variance than that of the isolated pilot tones. Simulation results are presented to verify our newly proposed theory.