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M-sequences and complete complementary codes

How do m-sequences meet complete complementary codes? Maximal length shift register sequences (m-sequences) found their first applications in signal detection in Explorer, the first satellite launched by US in 1958. Currently, it has found applications in almost every corner of engineering and computer science. The autocorrelation of m-sequences resembles that of white Gaussian noise, so it is also populated as pseudo noise, where the autocorrelation is computed in a circular way (i.e., periodic correlation). The concept of Golay sequence pair was first introduced by Golay in 1961 for the application of static multislit spectrometry (1951), and it was extended to complementary sequence set (CSS) and complete complementary codes since then. However, those autocorrelation functions are computed in a linear way (i.e., aperiodic correlation). The research in those two areas are parallelly advanced without any crossing point in about seven decades. In this talk, I will present a bridge which links the concepts of m-sequences, more generally, 2-level autocorrelation sequences and CSS/CCC through Hadamard matrices Hadamard matrices and permutations. I will show how to construct CSS/CCC starting with a single m-sequence or any 2-level autocorrelation sequence.