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Some recent progress on Costas arrays

A Costas array of order n is a $n \times n$ permutation array (with exactly one dot in every row and column and blanks elsewhere) such that every vector connecting two dots are distinct. The Costas property ensures that the array has ideal auto-correlation, which makes Costas arrays highly desired for use in RADAR and SONAR communications. We examine two particular constructions of Costas arrays known as the Taylor variant of the Lempel construction, or the T_4 construction, and the variant of the Golomb construction, or the G_4 construction. We connect these constructions with the concept of Fibonacci primitive roots, and show that under the Extended Riemann Hypothesis the T_4 and G_4 constructions are valid infinitely often. We also confirm Golomb and Moreno's conjecture that every ciricular sequence is Costas if and only if it is exponential Welch.