**Algebraic Symmetries of Generic Multidimensional Periodic Costas Arrays and their importance in the enumeration of Multidimensional Periodic Sonar Arrays**

José Ortiz-Ubarri*, Rafael Arce-Nazario, Gustavo Melendez, University of Puerto Rico

We present two symmetries of the generic multidimensional periodic Costas arrays over elementary abelian groups. Through exhaustive search, we observe that these two symmetries generate the Costas arrays for the enumeration up to p = 5 (5x5x24). Following the results, we conjecture that these generators characterize the group of symmetries of the generic (m+1)-dimensional periodic Costas arrays over elementary abelian groups. Through exhaustive search, we enumerated the 3x3x9 3D periodic sonar arrays for which no known algebraic constructions exists. We discuss the implications of the conjectures for Costas arrays on sonar arrays.

Keywords: Costas, sonars, enumeration, symmetries