

Abstract

Let F_q be the finite field of q elements, and let $D_{2n} = \langle x, y \mid x^n = 1, y^2 = 1, yxy = x^{n-1} \rangle$ be the dihedral group of $2n$ elements. Left ideals of the group algebra $F_q[D_{2n}]$ are known as left dihedral codes over F_q of length $2n$, and abbreviated as left D_{2n} -codes. Let $\gcd(n, q) = 1$. In this talk, we give an explicit representation for the Euclidean hull of every left D_{2n} -code over F_q . On this basis, we determine all distinct Euclidean LCD codes and Euclidean self-orthogonal codes which are left D_{2n} -codes over F_q . In particular, we provide an explicit representation and a precise enumeration for these two subclasses of left D_{2n} -codes and self-dual left D_{2n} -codes, respectively. Moreover, we give a direct and simple method for determining the encoder (generator matrix) of any left D_{2n} -code over F_q , and present several numerical examples to illustrate our applications.