

Abstract

In this paper, we study cyclic codes over Z_9 of length $3n$, where n is a positive integer satisfying $\gcd(3,n) = 1$. First, a canonical form decomposition of any cyclic code over Z_9 of length $3n$ are given and a unique set of generators for each subcode is presented. Hence the structure of any cyclic code over Z_9 of length $3n$ is determined. From this decomposition, formulas for the number of all codes and the number of codewords in each code are given. Then dual codes and self-duality of these codes are investigated. As an application, all 10061824 distinct cyclic codes over Z_9 of length 24 and all 544 self-dual codes among them are listed explicitly. Moreover, 280 new and good self-dual cyclic codes over Z_9 with basic parameters $(24, 3^{24}, 3)$ are obtained.