Polycyclic Codes over Galois Rings with Applications to Repeated-Root Constacyclic Codes.

Cyclic, negacyclic and constacyclic codes are part of a larger class of codes called polycyclic codes. These are codes which can be viewed as ideals of a factor ring of a polynomial ring. The ambient ring of polycyclic codes over $GR(p^a, m)$ is studied here. Along with some structure details of the ambient ring, the existence of a certain type of generating set for an ideal is proven. It is shown that these generating sets are strong Groebner bases. A method for finding such sets in the case that $a = 2$ is also given. The Hamming distance of certain constacyclic codes of length $np^a$ and $2np^a$ over $F_{pm}$ is computed. A method, which determines the Hamming distance of the constacyclic codes of length $np^a$ and $2np^a$ over $GR(p^a, m)$, is described. In particular, the Hamming distance of all cyclic codes of length $p^a$ over $GR(p^2, m)$ and all negacyclic codes of length $2p^a$ over $F_{pm}$ is determined explicitly. (Received January 17, 2012)