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On the equivalence of codes over finite rings and modules.

It has been shown by Wood (using character theory arguments) and by Greferath and Schmidt (using combinatorial arguments) that equivalences of linear codes over finite Frobenius rings are always monomial transformations. This result is an extension of the classical coding theory theorem due to MacWilliams asserting that this theorem holds for codes over finite fields. Hopes of extending this kind of result to codes over finite quasi-Frobenius rings have been ruled out by an example of Greferath and Schmidt. It seems natural therefore to conjecture that finite Frobenius rings are characterized precisely by the fact that equivalences of their linear codes are induced by monomial transformations. Wood has shown that this is indeed the case when the ring is commutative. In this talk, we will see that the result is also true for local, homogeneous semilocal and basic rings, among others. We will also present how our techniques can be used to tackle closely related problems arising in the recently proposed (by Greferath, Nechaev and Wisbauer) theory of codes over modules. (Received February 24, 2004)