

# Multivariable Codes in Principal Ideal Polynomial Quotient Rings

Edgar Martínez-Moro, Alejandro P. Nicolás  
Universidad de Valladolid (Spain)  
Ignacio F. Rúa  
Universidad de Oviedo (Spain)  
edgar@maf.uva.es

Multivariable codes over a finite field are a natural generalization of several classes of codes, including cyclic, negacyclic, constacyclic, polycyclic and abelian codes. Since these particular families have been also considered in the context of codes over a finite chain ring, we proposed constructions of multivariable codes over such a class of finite rings. As in the case of traditional cyclic codes over finite fields the modular case (i.e., codes with repeated roots) is much more difficult to handle than the semisimple case (i.e., codes with non-repeated roots). In this sense, different authors have dedicated their efforts to provide a better understanding of the properties of cyclic, negacyclic, constacyclic and polycyclic modular codes over a finite chain ring. Among these codes, those contained in an ambient space which is a principal ideal ring admit a relatively simple description, quite close to that of semisimple. This feature has been recently used in the description of abelian codes over a finite field, and in the description of modular additive cyclic codes over  $\mathbb{F}_4$ . As a natural continuation of these works, in this paper we consider the structure of multivariable modular codes in an ambient space which is a principal ideal ring.

## Keywords

Multivariable codes, codes over rings, Principal Ideal Polynomial Quotient Rings

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