

Solving Systems of Algebraic Equations Over Finite Commutative Rings and Applications

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Abstract

Several problems in algebraic geometry and coding theory over finite rings are modeled by systems of algebraic equations. In 2004, Nechaev and Mikhailov proposed two approaches to solving systems of polynomial equations over finite chain rings. One of these approaches uses canonical generating systems which are not Gröbner bases in general. Gröbner bases over finite chain rings are much studied and have been implemented in some mathematical software systems like Magma, SageMath, etc. In this talk, we show how Gröbner bases over finite chain rings can be used to solve systems of algebraic equations over finite commutative rings. Then, we give an algebraic approach to solving the rank decoding problem over finite commutative rings.