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Towards an Effective Mordell-Lang Theorem in positive characteristic

The general Mordell-Lang problem is to describe the intersection of a Zariski closed subset with a finitely generated abelian subgroup of a variety endowed with a natural group structure. Many interesting Diophantine problems can be described using this framework. We consider the problem of describing the intersection of a Zariski closed subset X of $\mathrm{GL}_d(K)$ with a finitely generated abelian subgroup Γ of $\mathrm{GL}_d(K)$ when K is a field of positive characteristic. We show that the set $X \cap \Gamma$ can be naturally described using the language of finite-state automata and, moreover, this description allows us to prove that the intersection can be effectively determined in this case. We discuss connections to S-unit equations and other Diophantine problems in positive characteristic. This is joint work with Boris Adamczewski