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Section:

4. Algebraic Geometry

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Polynomial Retracts and the Jacobian Conjecture

Let $K[x, y]$ be the polynomial algebra in two variables over a field K of characteristic 0. A subalgebra R of $K[x, y]$ is called a retract if there is an idempotent homomorphism (a *retraction*, or *projection*) $\varphi : K[x, y] \to K[x, y]$ such that $\varphi(K[x, y]) = R$. The presence of other, equivalent, definitions of retracts provides several different methods of studying and applying them, and brings together ideas from combinatorial algebra, homological algebra, and algebraic geometry. We characterize all the retracts of $K[x, y]$ up to an automorphism, and give several applications of this characterization, in particular, to the well-known Jacobian conjecture.
The talk is based on a recent joint paper accepted for publication in Transactions of the American Mathematical Society with Vladimir Shpilrain.