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Hilbert's 14th Problem: old and new results

Consider the polynomial ring $R = k[X_1, \dots, X_n]$ where k is a field, and let K be a field such that $k \subseteq K \subseteq k(X_1, \dots, X_n)$. Then Hilbert's 14th Problem asks whether $K \cap R$ is finitely generated as a k -algebra. We shall outline the current status of this problem, giving special attention to the case of locally nilpotent derivations and to recent results obtained by Bhatwadekar and the speaker.