

Description of the injective modules over the skew polynomial ring $K[x; \sigma, \delta]$.

by

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A classical result due to E.Matlis[1] says that over a left Noetherian ring every injective left module is a direct sum of indecomposable injective left modules. If K is a field, σ an automorphism of K , and δ a σ -derivation of K , then we can construct the skew polynomial ring $R = K[x; \sigma, \delta]$, which is a left and right Euclidean domain, and hence is left (and right) noetherian.

Motivated by a classic treatment of O.Ore[2], we take advantage of some factorization and decomposition theorems in R and present a nice description of the internal structure of an indecomposable injective module E . A consideration of the R -action on E and of the arithmetic of R on an element-by-element basis leads to a localization of R that allows us to describe the structure of E and determine its socle series.

[1] E.Matlis. *Injective modules over noetherian rings*. Pacific J.Math. **8** (1958), 511–528.

[2] O.Ore. *Theory of non-commutative polynomials*. Annals of Math.**34** (1932), 480–508.

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