Classifications of prime ideals and simple modules of the Weyl algebra A_1 in prime characteristic

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Abstract

Let K is an arbitrary field of characteristic $p > 0$. Classifications of prime, completely prime, maximal and primitive ideals and simple modules are obtained for the Weyl algebra $A_1 = K\langle x, \partial : \partial x - x\partial = 1\rangle$, the skew polynomial algebra $= K[h][x; \sigma]$ and the skew Laurent polynomial algebra $\mathcal{A} := K[h][x^{\pm 1}; \sigma]$ where $\sigma(h) = h-1$. The quotient rings (of fractions) of prime factor algebras of the algebras A_1, $\mathbb{A}$ and $\mathcal{A}$ are described. They are either fields or matrix algebras over *fields* or *cyclic* algebras.

Keywords

Weyl algebra, prime ideal, central simple algebra, cyclic algebra, division algebra

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References

[1] V. V. Bavula Classifications of prime ideals and simple modules of the Weyl algebra A_1 in prime characteristic. *Tokyo J. Math.l* **44**(1) (2023), 1–31.