Khalis, M.

Dimension de Krull des anneaux de séries formelles sur un produit fibré. (Krull dimension of formal power series rings on a fibre product). (French) Zbl 0748.13005

Rend. Circ. Mat. Palermo, II. Ser. 39, No. 3, 395-411 (1990).

Let T be a (commutative but not necessarily Noetherian) local integral domain, with maximal ideal $\mathcal{M}$ and residue field K. Let $\varphi : T \to K$ be the canonical homomorphism and let D be a proper subring of K. The author considers the Krull dimension of $R[[X]]$, where $R = \varphi^{-1}(D)$. *J. T. Arnold* [Trans. Am. Math. Soc. 177, 299-304 (1973; Zbl 0262.13007)] has introduced the concept of SFT- ring, and proved that if a commutative ring A is not an SFT-ring, then $\dim A[[X]]$ is infinite. Some sample results from the present paper are the following:

(a) R is an SFT-ring if and only if T and D are both SFT-rings; (b) if T is Noetherian, or if T is a discrete valuation ring (with value group possibly of rank greater than one), or if D is a field, then $\dim R[[X]] = \dim D[[X]] + \dim T[[X]] - 1$.

Using this result the author produces an example of a domain R of Krull dimension n such that: (1) $\dim R[[X]] = \dim R + 1$; (2) $R[[X]]$ is catenary; (3) R is neither Noetherian nor a discrete valuation ring. Thus R is a new type of ring with properties (1) and (2).

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MSC:

13C15	Dimension theory, depth, related commutative rings (catenary, etc.)
13F25	Formal power series rings

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