Separably Closed Fields Considered as Modules

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We present some results on the theory of modules of separably closed fields ([2]). Let $SCF_{p,e}$ be the first-order theory of separably closed fields of characteristic p and imperfection degree $e \in \omega \cup \{\infty\}$ in the language of fields ([3]). We consider the models of $SCF_{p,e}$ in a weaker language. We fix a model K of $SCF_{p,e}$ and a p-basis B of K. We may consider K as a module over the skew polynomial ring $R = \mathbb{F}_p(B)[t;\alpha]$, where α is the Frobenius map (see for instance [1]). We extend the ordinary language of modules with the analog of the p-component functions and we prove that the theory of separably closed fields considered as R-modules, is complete and admits quantifier elimination.

We prove also that our theory (though stable) is not superstable, we give a description of the types and we study the Ziegler space of indecomposables ([4]).

[1] Cohn, P. M., Skew fields, Encyclopedia of mathematics and its applications, edited by G.-C. Rota, volume 57, Cambridge University Press, 1995.

[2] Dellunde, P., Delon, F., Point, F., Theory of modules of separably closed fields, Preprint, 1999.

[3] Ershov Y., Fields with a solvable theory, Doklady 174, 1967, pp. 19-20; English translation in Soviet Mathematics 8, 1967, pp. 575-576.

[4] Ziegler M., Model Theory of modules, Annals of Pure and Applied Logic 26, 1984, pp. 149-213.

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