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SUMMARY

Let k be a perfect field of characteristic $p \neq 0$, let $A = W(k)$ the ring of Witt vectors with coefficients in k and let $D_k = A[\underline{F},\underline{V}]$ the Dieudonné-ring, i.e. the (non-commutative, if $k \neq \mathbb{F}_p$) ring generated by A and two elements $\underline{F}$ and $\underline{V}$ subject to the relations

$$\begin{cases} \underline{F}\,\underline{V} = \underline{V}\,\underline{F} = p \,, \\ \underline{F}\,a = \sigma(a)\underline{F} \,, \quad a\underline{V} = \underline{V}\sigma(a) \,, \text{ for any } a \in A \end{cases}$$

(where σ is the absolute Frobenius on A).

It is well-known that commutative finite group-schemes, of rank a power of p, can be classified by their Dieudonné-modules, which are left D_k-modules, of finite length as A-modules.

By using Witt covectors, we give a new description of the Dieudonné-module $\underline{M}(G)$ of such a group G : we construct a commutative formal group-scheme $\widehat{CW}_k$ over k, whose endomorphisms ring contains D_k, and then $\underline{M}(G)$ is defined as $\mathrm{Hom}(G,\widehat{CW}_k)$. This construction avoid the decomposition of the group into an unipotent group and a multiplicative type one. We give also a description of G, as a group-functor, in terms of $\underline{M}(G)$: if $M = \underline{M}(G)$, for any finite, commutative and associative k-algebra R, the group $G(R)$ can be identified, canonically and functorially in R and G, to $\mathrm{Hom}_{D_k}(M,\widehat{CW}_k(R))$.

Since Grothendieck and Messing, one knows that it is possible to associate to any p-divisible group H over A a couple (L,M), where M is the Dieudonné-module of the special fiber of H and L a suitable sub-A-module of M, and that the correspondence $H \mapsto (L,M)$ classifies p-divisible groups over A. A new construction of the functor $H \mapsto (L,M)$ is given (actually, not exactly the same (L,M) as in Grothendieck or Messing). We give also a description of a quasi-inverse functor, as well as a description of the Tate-module of H in terms of the couple (L,M).

Suitable generalisations of those results to p-divisible groups and commutative smooth formal group-schemes over the integers of a local field of characteristic 0 and residue field k are given.

We explain also how our constructions are related to the work of Cartier on commutative formal group-laws over k and of Honda on commutative formal group-laws over k and W(k) .

CONTENTS :