Ideais maximais cíclicos da álgebra de Weyl

Daniel Levkovitz*
ICMSC-USP
São Carlos - SP

We prove that if the order-one differential operator $S = \partial_1 + \sum_{i=2}^{n} \beta_i \partial_i + \gamma$, with $\beta_i,\ \gamma \in K[x_1, \ldots, x_n]$, generates a maximal left ideal of the Weyl algebra $A_n(K)$, then S does not admit any Darboux differential operator in $K[x_1, \ldots, x_n] < \partial_2, \ldots, \partial_n >$, hence in particular, the derivation $\partial_1 + \sum_{i=2}^{n} \beta_i \partial_i$ does not admit any Darboux polynomial in $K[x_1, \ldots, x_n]$. We show that the converse is true when $\beta_i \in K[x_1, x_i]$, for every $i = 2, \cdots, n$. Then, we generalize to $K[x_1, \ldots, x_n]$ the classical result of Shamsuddin that characterizes the simple linear derivations of $K[x_1, x_2]$. Finally, we establish a criterion for the left ideal generated by S in $A_n(K)$ to be maximal in terms of the existence of polynomial solutions of a finite system of differential polynomial equations.

---

*