Telescopers for differential forms with one parameter

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Parallel telecopers introduced in \cite{1} can be regarded as telecopers for differential 1-forms. In this talk, we generalize the results in \cite{1} into differential $p$-forms. Precisely, let

$$\omega = \sum_{i_1, \ldots, i_p} f_{i_1, \ldots, i_p} \, dx_{i_1} \wedge dx_{i_2} \wedge \cdots \wedge dx_{i_p}$$

be a differential $p$-form, where $f_{i_1, \ldots, i_p}$ is $D$-finite over $k(x_1, \cdots, x_N, t)$. A nonzero operator $L \in k(t)[\partial]$ is called a telescope for $\omega$ if $L(\omega) = d\eta$ for some differential $p-1$-form $\eta$. We present a sufficient and necessary condition for a given differential $p$-form having a telescope and develop an algorithm to compute a telescope if it exists. We also give an algorithm to decide whether a given differential $p$-form has a telescope or not.

Keywords

telecope, differential form.

References

[1] R. Feng; S. Chen; Z. Li; M. F. Singer, Parallel Telescoping and Parametrized Picard-Vessiot Theory. \textit{Proc. ISSAC2014}, July 23-25, Kobe, Japan, 99-104, ACM Press, 2014.