

Telescopers for differential forms with one parameter

Shaoshi Chen¹, Ruyong Feng¹, Ziming Li¹,

Michael F. Singer², Stephen Watt³

[ryfeng@amss.ac.cn]

¹ KLMM, AMSS, Chinese Academy of Sciences, China

² North Carolina State University, USA

³ University of Waterloo, Canada

Parallel telescopers introduced in [1] can be regarded as telescopers for differential 1-forms. In this talk, we generalize the results in [1] into differential p -forms. Precisely, let

$$\omega = \sum f_{i_1, \dots, i_p} dx_{i_1} \wedge dx_{i_2} \wedge \dots \wedge dx_{i_p}$$

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

Keywords

telescoper, differential form.

References

[1] R. FENG; S. CHEN; Z. LI; M.F. SINGER, Parallel Telescoping and Parametrized Picard-Vessiot Theory. *Proc. ISSAC2014*, July 23-25, Kobe, Japan, 99-104, ACM Press, 2014.