Resurgent structures in differential equations

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Abstract

The aim of this series of lectures is to study resurgent structures of formal series solutions of differential equations. Resurgent analysis was developed by J. Écalle in his book [1] and now, his theory is widely used in several areas: Dynamical systems, multiple zeta values, Mathematical physics and so on.

In this lecture, we focus on the analysis of differential equations. We start from the basics of resurgent analysis and explain resurgent structures of the formal series solutions from the viewpoint of convolution products based on [2] and [3]. Further, we mention recent trends in resurgent analysis.

A tentative plan of the lecture is the following:

1. Basics in resurgent analysis

2. Convolution product and resurgence

3. Resurgent structure of formal series solutions

4. Recent trends in resurgent analysis

References

[1] J. Écalle: *Les fonctions résurgentes*, Publ. Math. d'Orsay, Université Paris Sud, Vol.1 (81-05), 2(81-06), 3(85-05), 1981 and 1985.

[2] S. Kamimoto: *Resurgence of formal series solutions of nonlinear differential and difference equations*, Proc. Japan Acad. Ser. A Math. Sci. **92** (2016), no. 8, 92–95.

[3] S. Kamimoto and D. Sauzin: *Iterated convolutions and endless Riemann surfaces* , to appear in Annali della Scuola Normale Superiore di Pisa, Classe di Scienze.