

On $\mathbb{R}$ -holonomic complexes

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The purpose of this talk is to report the following surprising fact:

The $\mathcal{E}^{\mathbb{R}}$ -Module generated by $\mathcal{V}(t)$, the theta-zerovalue, is isomorphic to the sheaf $\mathcal{C}$ of microfunctions.

This fact may be compared with the elementary fact that the simplest holonomic $\mathcal{D}$ -Module $\mathcal{D} \cdot 1$ is nothing but the sheaf $\mathcal{O}$ of holomorphic functions. Of course, in the present situation of $\mathbb{R}$ -holonomic complexes, the above assertion is far from obvious. Its proof is based upon the reconstruction theorem proved in [2] and the explicit calculation in [1] of some cohomology groups associated with the system of linear differential equations of infinite order that $\mathcal{V}(t)$ solves.

The following mysterious result is also reported:

For any real number α , we can find an invertible (micro-) differential operator Q_{α} which satisfies

$$\mathcal{V}(t+\alpha) = Q_{\alpha} \mathcal{V}(t).$$

Although this again follows from the reconstruction theorem in its abstract form, we can give a recipe how to construct Q_{α} with the aid of a division theorem for operators of infinite order.

References

- [1] Kawai, T.: An example of a complex of linear differential operators of infinite order. Proc. Japan Acad., 59, Ser. A. (1983), 113-115.
- [2] Sato, M., M. Kashiwara and T. Kawai: Microlocal analysis of theta functions. To appear.