The Cauchy problem for p-evolution equations in Gevrey spaces

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We study the Cauchy problem

$$\begin{cases} P(t, x, D_t, D_x)u(t,x) = f(t,x) \\ u(0,x) = g(x) \end{cases} \quad , \qquad (t,x) \in [0,T] \times \mathbb{R}, \tag{1}$$

for p-evolution operators of the form

$$P(t, x, D_t, D_x) = D_t + a_p(t)D_x^p + \sum_{j=1}^{p-1} a_j(t,x)D_x^j, \qquad (t,x) \in [0,T] \times \mathbb{R},$$

where $a_p \in C([0,T], \mathbb{R})$ and $a_j \in C([0,T], C^\infty(\mathbb{R}; \mathbb{C})), j = 0, \ldots, p-1$, in the Gevrey functional setting. When the coefficients $a_j(t,x), j = 0, \ldots, p-1$, of the lower order terms are complex-valued, it is possible to obtain well-posedness results in Gevrey spaces under suitable decay assumptions on a_j for $|x| \to \infty$. In the first part of the talk, we present a well-posedness result for 3-evolution equations obtained in [1]. In the second part we discuss necessary conditions for Gevrey well-posedness in the case of p-evolution equations for an arbitrary positive integer p, see [2]. The results presented in the talk are obtained in collaboration with Alexandre Arias Junior (Università di Torino) and Alessia Ascanelli (Università di Ferrara).

References

1 A. Arias Junior, A. Ascanelli, M. Cappiello, *Gevrey well-posedness for 3-evolution equatons with variable coefficients*, 2022. To appear in Ann. Scuola Norm. Sup. Pisa Cl. Sci. DOI: 10.2422/2036-2145.202202_011, https://arxiv.org/abs/2106.09511

2 A. Arias Junior, A. Ascanelli, M. Cappiello, *On the Cauchy problem for p-evolution equations with variable coefficients: a necessary condition for Gevrey well-posedness.* Preprint (2023), https://arxiv.org/abs/2309.05571