ID de Contribution: **8** Type: **Non spécifié**

Formal transversality of the infinitesimal generator along the fixed point set

mardi 11 février 2025 14:00 (50 minutes)

Given a tangent to the identity germ of holomorphic diffeomorphism ϕ, we consider the map $P \mapsto \phi_P$ that associates to any fixed point P of ϕ near the origin the germ ϕ_P of ϕ at P. Such germs are not in general tangent to the identity. Given the infinitesimal generator X of ϕ, a formal vector field, it is natural to ask whether we can define "infinitesimal generators" X_P of ϕ_P for $P \in \mathrm{Fix}(\phi)$ and if the dependence of X_P on $P \in \mathrm{Fix}(\phi)$ is analytic. In other works, we are asking whether X is formally transversal along $\mathrm{Fix}(\phi)$.

We introduce a weak and a strong concept of formal transversality for X. On the one hand, we will see that X is always formally transversal along $\mathrm{Fix}(\phi)$ in the weak sense. On the other hand, there are examples where X is not formally transversal along $\mathrm{Fix}(\phi)$ in the strong sense. We will discuss the gap between the weak and the strong concepts and provide a characterization of strong formal transversality. This is a joint work with Rudy Rosas.

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