JET SCHEMES OF SINGULARITIES

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Let $X \subset \mathbb{C}^3$ be the hypersurface defined by $f(x,y,z) \in \mathbb{C}[x,y,z]$. Let $m \in \mathbb{N}$. A morphism

$$\varphi^*\colon Spec(\frac{\mathbb{C}[[t]]}{\langle t^{m+1}\rangle}) \to X$$

is called an m-jet of X. The space of m-jets of X is the m-jet scheme of X denoted by $J_m(X)$. We define

$$\varphi\colon \frac{\mathbb{C}[x,y,z]}{\langle f\rangle} \to \frac{\mathbb{C}[t]}{\langle t^{m+1}\rangle}$$
$$(x,y,z) \mapsto (x(t),y(t),z(t))$$

where $\varphi(x) = x(t) = x_0 + x_1 t + x_2 t^2 + \ldots + x_m t^m \in \frac{\mathbb{C}[t]}{\langle t^{m+1}\rangle}$
$\varphi(y) = y(t) = y_0 + y_1 t + y_2 t^2 + \ldots + y_m t^m \in \frac{\mathbb{C}[t]}{\langle t^{m+1}\rangle}$
$\varphi(z) = z(t) = z_0 + z_1 t + z_2 t^2 + \ldots + z_m t^m \in \frac{\mathbb{C}[t]}{\langle t^{m+1}\rangle}$

We have $f(x(t),y(t),z(t)) = F_0 + tF_1 + t^2F_2 + \ldots + t^mF_m = 0 \pmod{t^{m+1}}$. The m-jet scheme of X is

$$J_m(X) = Spec(\frac{\mathbb{C}[x_i,y_i,z_i;\quad i=1,2,\ldots m]}{\langle F_0,F_1,\ldots,F_m\rangle})$$

The motivation of this talk is the following question: Given the jet schemes of X can we construct a resolution of X?

We give a positive answer for this question.

This is a part of the joint work with H. Mourtada, C. Plénat and M. Tosun.

References

[1] A. Altıntaş Sharland, G. Çevik and M. Tosun, *Nonisolated forms of rational triple singularities*, Rocky Mountain J. Math. 46-2, (2016), 357-388.
[2] B. Karadeniz, H. Mourtada, C. Plénat and M. Tosun, The embedded Nash problem of birational models of rational triple singularities, J. of Singularities, 22, (2020), 337-372.