# JET SCHEMES OF A SINGULARITY

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Let $X \subset \mathbb{C}^3$ be the hypersurface obtained as the zero locus of $f(x,y,z) \in \mathbb{C}[x,y,z]$. Let $m \in \mathbb{N}$. The $m^{th}$ jet of $X$ is a parameterized curve given by

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

where $x(t) = x_0 + x_1 t + x_2 t^2 + \ldots + x_m t^m \pmod{t^{m+1}}$
$y(t) = y_0 + y_1 t + y_2 t^2 + \ldots + y_m t^m \pmod{t^{m+1}}$
$z(t) = z_0 + z_1 t + z_2 t^2 + \ldots + z_m t^m \pmod{t^{m+1}}$

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

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

We give a positive answer for the following question for some special $X$:

Can one construct an embedded resolution of singularities of $X \subset \mathbb{C}^3$ from the irreducible components of the jet schemes centered at the singular locus?

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.