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Section:

4. Algebraic Geometry

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Maximum number of cusps on algebraic plane curves and nodes on surfaces

Let $C_d \subset \mathbb{P}^2_{\mathbb{C}}$ be an irreducible algebraic curve of degree d. By the morphism $(x_0, x_1, x_2) \mapsto (x_0^q, x_1^q, x_2^q)$, $q \in \mathbb{N}$ and $q \geq 2$, sequences of curves with finite many *ordinary cusps* are obtained. Among them is a sequence of irreducible curves, obtained from a quartic with three cusps, of degree $d = 36 \cdot q^r$, $q = 3$, $r \in \mathbb{N}$, with $\frac{1019}{3456} d^2 - \frac{d}{4} - \frac{9}{8}$ cusps.

The leading coefficient improves Hirano's $\frac{9}{32} = \frac{972}{3456}$ and is rather close to the limitation from above $\frac{5}{16} = \frac{1080}{3456}$ due to K. Ivinskis.

In a forthcoming joint paper with E. Stagnaro, the generalization of the method to $\mathbb{P}^3_{\mathbb{C}}$ with $q = 2$ transforms a cubic surface into one of degree 12 with 584 *nodes* improving Kreiss' and Chmutov's result of 576 nodes; Miyaoka's limitation is 645.