

Zariski's theorem via tropical geometry

Ilya Tyomkin

Ben Gurion, Israel

Abstract:

Varieties parameterizing reduced plane curves of given degree and geometric genus were introduced in 20s by Severi. In 1982, Zariski gave a dimension-theoretic characterization of Severi varieties, and proved that a general point of a Severi variety corresponds to a nodal curve. Zariski's theorem played an important role in Harris's proof of the irreducibility of Severi varieties, and in a series of enumerative results. It was generalized to the case of other rational surfaces and to the case of curves satisfying certain tangency conditions, but no known proof covered the case of positive characteristic.

In my talk I will explain how to use tropical geometry to obtain the dimension-theoretic characterization of Severi varieties in arbitrary characteristic. Although the statement about nodality of a general plane curve of given degree and geometric genus in positive characteristic is still open, I will give examples of Severi varieties on weighted projective planes and Severi varieties parameterizing plane curves with certain tangency conditions, whose general points correspond to singular non-nodal curves in positive characteristic.