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GRADUATE STUDENT SEMINAR

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Classification of quartic plane Cremona maps with a maximum of two proper base points

Abstract

At first I will give a general introduction to blow-ups and birational maps and explaining then the connection between plane Cremona maps, linear systems and clusters of points. A plane Cremona map $\Phi : \mathbb{P}_1^2 \dashrightarrow \mathbb{P}_2^2$ is associated to a linear system \mathcal{L} , therefore a fundamental point is a base point of \mathcal{L} . The points in \mathbb{P}_1^2 are proper points but there are also infinitely near points, which are proper points in a suitable surface obtained by blow-ups. Infinitely near points lie in so-called neighbourhoods of other points, this relation can be represented by a tree-graph named Enriques diagram. Every plane Cremona map Φ has a unique Enriques diagram. When blowing up all base points of Φ we get different values for each point and can represent them by curves, i.e. lines, conics, cubics and so on going through the base points. The curves of Φ and Φ^{-1} coincide.

The procedure of finding the types of quartic plane Cremona maps with a maximum of two proper points is to establish primarily the Enriques diagram, then identifying the base points and with that derive \mathcal{L} and Φ .

The results were 3 types of quartic plane Cremona maps with one proper point and 22 types with two proper points, represented as enriched weighted proximity graphs and their birational map up to coordinate change. In the end it was proven, that none of the types is equivalent to another.