

On the Geometry of Syzygies of Birational Maps

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Abstract:

Given a birational map between projective varieties, one may consider a set of polynomials over the coordinate ring of the domain as a representation of the map. Although this representation is not unique but there exist several numerical invariants associated to the ideal defined by it which depend only on the map and not the representative. Among them one may find the syzygies of the ideal and the Castelnuovo-Mumford regularity. In this talk, starting from the Plane Cremona maps, we show how the Betti table of the base ideal constrains birationality. Moving from Plane case to higher dimensions, we encounter the role of higher polynomials equations of the base ideal, consequently the structure of the Rees algebra appears. We present the Birationality Criterion and finally show that if an n -dimensional Cremona map has an Arithmetically Cohen-Macaulay graph then the degree of the representing polynomials cannot exceed n^2 .