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Configurations of lines on del Pezzo surfaces of degree 1

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Abstract

Del Pezzo surfaces are classified by their degree d, which is an integer between 1 and 9. Famous examples are the smooth cubic surfaces in $\mathbb{P}^3$ ($d = 3$). Over an algebraically closed field, these contain 27 lines, of which at most three can go through the same point. Similarly, a del Pezzo surface of degree two contains 56 lines, of which at most four can go through the same point. In both of these cases, this maximum is given by the incidence graph of the lines. A del Pezzo surface of degree one contains 240 lines, and the upper bound given by the incidence graph for the number of lines that go through the same point is 16. However, in joint work with Ronald van Luijk we show that in almost all characteristics, the maximal number of lines that go through the same point is 10.

In this talk I will first motivate the study of the configurations of the 240 lines. I will then show how we proved our result using the E_8 root system, classical algebraic geometry, and symbolic computation with Groebner bases.

Date : Friday, May 27, 2022
Time : 17:00
Place: Zoom & Boğaziçi University, South Campus