

Streszczenie pracy w języku angielskim

This thesis investigates geometric properties of arrangements of low-degree plane algebraic curves in the complex projective plane. The primary focus is on configurations of lines, conics, and cubics, with particular emphasis on higher-order tangency points and algebraic properties related to logarithmic derivations and freeness. All necessary computations were carried out using the computer algebra system Singular.

Chapter 2 is devoted to Fermat curves, in particular the Fermat curve F_n and the cubic F_3 . The exact coordinates of sextactic points and type 9 points are determined using the second Hessian and division polynomials. Furthermore, configurations of conics tangent to F_3 at two such points with prescribed multiplicities are analyzed.

Chapter 3 examines two quartic curves: the Fermat quartic and the Komiya–Kuribayashi quartic. Their maximal tangency points and the associated configurations of lines are described in detail. In addition, the sextactic points of both quartics and related arrangements of tangent conics are investigated.

Chapter 4 establishes a complete classification of free arrangements of three smooth conics with ADE singularities, up to projective equivalence. For each case, explicit defining equations and the coordinates of all singular points are determined.