Bernoullis Tafelrunde

Graduate Student Seminar

Thursday, 23 April, 12:15-13:00
Seminarraum 05.002, Spiegelgasse 5

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Topology of real algebraic curves in the projective plane

Abstract

A plane projective curve is defined as the set of points in the projective plane where a homogeneous polynomial in three variables vanishes. Over the complex numbers, the topology of such a curve, if it is smooth, depends only on the degree d of the defining equation; it is classically known to be a Riemann surface of genus $g = (d-1)(d-2)/2$. Over the real numbers however, the topology of the curve changes depending on the coefficients of the defining equation. The classification of the topological possibilities, which is part of Hilbert's sixteenth problem, is known only for curves of small degree. I will present some methods which allow to classify the topological types for curves of small degrees, notably the theorem of Harnack (1876), stating that the number of connected components of a real curve is bounded by g+1, where g is the genus of the associated complex curve.