INTRINSIC PROPERTIES AND INVARIANT OF PLANAR ALGEBRAIC CURVES AND THEIR APPLICATIONS

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abstract

Algebraic curve is an important research object and tool in many mathematical fields such as pure mathematics (algebraic geometry, transcendental numbers) and applied mathematics(interpolations and splines, CAGD, and approximation, etc.). The aim of this talk is to show an equivalence relation between the study of the intrinsic properties of planar algebraic curves and the study of singularity of bivariate spline spaces, and to investigate the absorbing properties of algebraic curves by means of spline approach. To study the intrinsic properties of algebraic curves in the projection plane, some definitions such as *characteristic ratio* of points on a line, *characteristic mapping* of point or line, and *characteristic number* of algebraic curve are proposed, and then an intrinsic invariant of any algebraic curve in a so called *Pascal space* is discovered by using the above concepts and the spline method. As another main result, the classical Pascal's theorem is generalized skillfully for the case of algebraic curve of higher degree $n \geq 3$ in the Pascal space by recursive form. This extension is quite different from the generalizations to Pascal's theorem such as Chasles's Theorem and Cayley-Bacharach Theorem in algebraic geometry. Some examples to the Pascal's type theorem are given to interpret our results more clearly. Meanwhile, the singularity of the spline space over Morgan-Scott's partition can be settled from our results by using the duality principle. Our results seem to be subservient to further study the classification and rational parametrization of algebraic curves, and classification of finite groups, etc.

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