

English summaries

Josep Burillo

Groups and the Banach-Tarski paradox

In this paper we will present a proof of the Banach-Tarski paradox for \mathbb{R}^3 , and of the fact that this paradox is not possible in \mathbb{R}^2 . Both proofs have a crucial point where discrete groups are involved, especially around the concept of amenability. Thus, we develop this concept, giving examples of amenable and nonamenable groups, and show the cornerstone contribution by Følner to the theory of amenable groups. Finally, we give an insight of why 21st century group theorists are interested in amenability.

Keywords: Banach-Tarski paradox, paradoxical decomposition, free group, amenable group.

MSC2000 Subject Classification: 43A07, 03E25, 20E05.

Carlos D'Andrea and Martín Sombra

On parametric curves and Newton polygons

Algebraic curves and surfaces can be defined as solutions of polynomial equations and, sometimes, by parametric equations of rational functions as well. We consider the problem of moving from parametric to implicit representations, a usually involved process. We also explore the possibility of obtaining an object close to the implicit equations from the parametric ones: the Newton polytop of a hypersurface given in parametric form.

Keywords: parametric curves, Newton polytopes, tropical geometry, intersection theory.

MSC2000 Subject Classification: Primary 14Q05, secondary 12Y05, 52B20, 14C17.

Artur Nicolau

Cancellation and selfimproving

In this paper two problems in classical analysis are presented: the growth of the divided differences of Weierstrass functions and the regularity of Besicovitch measures. Dyadic martingale techniques are used in order to obtain several versions of the law of the iterated logarithm.

Keywords: Dyadic martingales, law of the iterated logarithm.

MSC2000 Subject Classification: 60G46, 28A78, 28D20.

Carles Noguera i Clofent

A mathematical approach to the problem of vagueness

In this paper we consider the vagueness phenomenon as a logical problem and the solutions that have been proposed to deal with it. Among them we defend Mathematical Fuzzy Logic as a genuinely mathematical approach to the problem, as it turns out to be the most appropriate for developing applications. We present the logical and algebraic foundations of the discipline from the perspective of their motivations and history, and we end with a panoramic view on the current state of the art and future developments.

Keywords: Fuzzy sets, artificial intelligence, mathematical fuzzy logic, mathematical logic, reasoning, vagueness.

MSC2000 Subject Classification: 03A05, 03B52, 03B50, 03G10, 68T27.
