IPM-Isfahan

Public Lecture, IPM-Isfahan

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Title:

Applications of Ultraproducts of Finite Structures to Combinatorics

Abstract: *The fundamental theorem of ultraproducts (Los' Theorem) provides a transference principle between the finite structures and their limits. Roughy speaking, it states that a formula is true in the ultraproduct M of an infinite class of structures if and only if it is true for "almost every" structure in the class.*

When applied to ultraproducts of finite structures, Los' theorem presents an interesting duality between finite structures and their infinite ultraproducts. This kind of finite/infinite connection can sometimes be used to prove qualitative properties of large finite structures using the powerful known methods and results coming from infinite model theory, and in the other direction, quantitative properties in the finite structures often induce desirable model-theoretic properties in their ultraproducts.

These ideas were used by Hrushovski to apply ideas from geometric model theory to additive combinatorics, locally compact groups and linear approximate subgroups. More examples of this fruitful interaction were given by Goldbring and Towsner to provide proofs of the Szemerédi's regularity lemma and Szemerédi's theorem: every subset of the integers with positive density contains arbitrarily large arithmetic progressions.

The purpose of the talk will be to present these ideas and outline some of the applications to asymptotic combinatorics.

November 3, 2016 (13 th Aban 1395) at 11:00-12:00.

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