SECOND ORDER STRUCTURE OF MODELS OF FIRST ORDER ARITHMETIC

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Topic #1: *Nonstandard Theories and Models, and Foundations of Nonstandard Methods.*

Let M be a model of PA. A subset X of M is a class if the intersection of X with every bounded definable subset of M is definable. A model whose all classes are definable is called rather classless. While a typical model of PA has undefinable classes, rather classless models exist and they are frequently used in constructions of other nonstandard structures with interesting properties. For example, by a result of H.Jerome Keisler, every rather classless model M is the set of nonnegative integers of a real closed field R(M) whose cardinality is the same as the cardinality of M. While one can prove that rather classless models exist directly from a version of the MacDowell-Specker Theorem, the question whether there are rather classless models with certain prescribed amount of saturation is more difficult. I will talk about a construction of a recursively saturated rather classless model of PA due to Matt Kaufmann and I will survey other related results mostly due to Ali Enayat, James Schmerl and myself.

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