Nonstandard Models of Arithmetic and Ramsey's Theorem

Yang Yue

National University of Singapore

Singapore

This talk touches three different topics: Ramsey's Theorem in combinatorics, computability on weak fragments of arithmetic, and reverse mathematics. The last two topics belong to recursion theory. By weak fragments of arithmetic, we mean subsystems of first order arithmetic with limited induction, whose models are necessarily nonstandard. Reverse mathematics asks which subsystems of second order arithmetic are optimal to prove a given mathematical theorem. Most of the results in reverse mathematics make use of the so-called "ω-model", which has the standard model ω as its first order part. In the recent study of Ramsey's Theorem for pairs, we discovered some nice applications of nonstandard models to reverse mathematics. Using nonstandard models, we have obtained better understanding of the first order and second order consequences of combinatorial statements related to Ramsey's theorem for pairs. This is a joint work with C.T. Chong and Ted Slaman.