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Tomer Kotek* (tkotek@cs.technion.ac.il), **Johann A. Makowsky** (janos@cs.technion.ac.il) and **Boris Zilber** (zilber@maths.ox.ac.uk). *Why is the chromatic polynomial a polynomial? A model theoretic interpretation.*

The notion of graph polynomials definable in Monadic Second Order Logic, MSOL, was introduced by B. Courcelle, J.A. Makowsky and U. Rotics in 2001. It was shown later that the Tutte polynomial and its generalization, as well as the matching polynomial, the cover polynomial and the various interlace polynomials fall into this category.

In this talk we present a model theoretic framework of graph polynomials based on counting functions of generalized colorings. We show that this class encompasses the examples of graph polynomials from the literature. Furthermore, we extend the definition of graph polynomials definable in MSOL to allow definability in full second order, SOL. Finally, we show that the SOL-definable graph polynomials extended with a combinatorial counting function are exactly the counting functions of generalized colorings definable in SOL. (Received August 30, 2008)