

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE  
UNIVERSITY OF SOUTHERN DENMARK, ODENSE

# COMPUTER SCIENCE COLLOQUIUM

## SAT Modulo Non-Linear Arithmetic for Termination Analysis

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### Abstract:

Efficiently solving non-linear polynomial constraints plays an important role for many techniques in automated termination analysis, such as polynomial interpretations. We present both the classical setting, where polynomials with coefficients from the natural numbers are used, and several recent extensions to max-polynomials and to polynomials over the reals.

In these settings, the current state of the art for solving constraints from SAT modulo non-linear arithmetic is represented by an eager encoding: Not only is the Boolean structure of the constraints represented on logical level, but also the atomic arithmetical constraints themselves are encoded to SAT. Then the actual search is performed by a modern SAT solver like MiniSAT, which does not employ dedicated domain knowledge for arithmetic. This way, we have achieved speed improvements by orders of magnitude over earlier dedicated techniques for solving such constraints.

Host: Peter Schneider-Kamp