

# SPASS-SATT v1.1

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**Abstract.** SPASS-SATT is a CDCL(LA) solver for linear rational and linear mixed/integer arithmetic. This system description summarizes its main features.

**Keywords:** Linear Arithmetic, Integer Arithmetic, SMT, Preprocessing

SPASS-SATT (v1.1) is a sound and complete CDCL(LA) [3,12,13,14] solver for quantifier-free linear rational and linear mixed/integer arithmetic. It is a from-scratch implementation except for some basic data structures taken from the SPASS [17] superposition theorem prover. It is available through the SPASS-Workbench [1].

The techniques that appeared first in SPASS-SATT are the unit cube test [6,7] and bounding transformations [4]. Concerning preprocessing, SPASS-SATT is the first SMT solver implementing the small-clause-normal-form algorithm [15]. Further important techniques implemented in SPASS-SATT have already been available in other SMT solvers such as CVC4 [2], MathSAT [8], Yices [10], and Z3 [9], but not all in one tool: *(i)* the implementation of branch and bound as a separate theory solver and a number of improvements to the simplex implementation such as a priority queue for pivot selection, integer coefficients instead of rational coefficients, dynamically switching between native and arbitrary precision integers, and backing-up versus recalculating simplex states, *(ii)* weakened early pruning [16], decision recommendations, unate propagations [11], and bound refinements [11] for the interaction between the SAT and theory solver, and *(iii)* preprocessing techniques for if-then-else operators and pseudo-boolean inequalities. Although these techniques are contained in existing SMT solvers, not all have been described in the respective literature. We remedy this in an extended version of this system description that will be published in the CADE-27 proceedings [5].

For the 14th International Satisfiability Modulo Theories Competition (SMT-COMP 2019), SPASS-SATT runs in its default configuration, i.e., without any command line options. By default all mentioned techniques are turned on.

## References

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