

Alessandro Artale, Andrea Mazzullo

Free University of Bozen-Bolzano

Title: Decidability in First-Order Modal Logic with Non-Rigid Constants and Definite Descriptions

Abstract: While modal extensions of decidable fragments of first-order logic are usually undecidable, their monodic counterparts, in which formulas in the scope of modal operators have at most one free variable, are typically decidable. This only holds, however, under the provision that non-rigid constants, definite descriptions and non-trivial counting are not admitted. Indeed, several monodic fragments having at least one of these features are known to be undecidable. We present recent results (from a joint work with [Christopher Hampson](#), [Roman Kontchakov](#), and [Frank Wolter](#)) on these features, showing that fundamental monodic fragments such as the two-variable fragment with counting and the guarded fragment of standard first-order modal logics K_n and $S5_n$ are decidable. Tight complexity bounds are established as well. Under the expanding-domain semantics, we show decidability of the basic modal logic extended with the transitive closure operator on finite acyclic frames; this logic, however, is Ackermann-hard.