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Set-based proof-verification and its complexity[1]
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The inferential armory of an automated proof assistant based on Set Theory must include algorithms which, inside specific fragments of the underlying symbolic language, can establish whether or not a given formula is satisfiable in the von Neumann universe. One such decision algorithm, regarding the fragment named Multi-Level Syllogistic (in short MLS), was devised in 1979 and proliferated many others; today, an enriched variant of it plays a key role in the proof-checker AEtnaNova. Since the satisfiability problem for MLS is NP-complete, in view of the pervasiveness of its decision mechanism in actual uses of AEtnaNova, an investigation was undertaken aimed at identifying useful sublanguages of MLS whose satisfiability tests have polynomial-time worst-case complexity. This contribution, grounded on ongoing research, reports on a comprehensive taxonomy of polynomial and NP-complete fragments of set theory.

[1] Joint work with Domenico Cantone and Pietro Maugeri.