**Syntax and semantics**

The formulas of the relational mu-calculus are given by the grammar



where x and Z are boolean variables, and ˆx is a tuple of variables. In the formulas µZ.f and νZ.f, any occurrence of Z in f is required to fall within an even number of complementation symbols ¯; such an f is said to be formally monotone in Z.

**Coding CTL models and specifications**

Given a CTL model M = (S, →, L), the µ and ν operators permit us to translate any CTL formula φ into a formula, fφ, of the relational mu-calculus such that fφ represents the set of states s ∈ S with s φ. Since we already saw how to represent subsets of states as such formulas, we can then capture the model-checking problem.



of whether all initial states s ∈ I satisfy φ, in purely symbolic form: we answer in the affirmative if fI · f φ is unsatisfiable, where fI is the characteristic function of I ⊆ S. Otherwise, the logical structure of fI · f φ may be exploited to extract debugging information for correcting the model M in order to make true.