The first level predicate calculus of mutually-inversistic logic is quantifier-free

Xunwei Zhou

(Institute of Information Technology, Beijing Union University, 97 Beisihuandong Road, Beijing, China, zhouxunwei@263.net)

The first level predicate calculus of mutually-inversistic logic is quantifier-free. A proposition in the form of parent(x,y)$\wedge$ancestor(y,z)$\leq^{-1}$ancestor(x,z) is called a first-order single empirical or mathematical connection proposition, where x, y, z are term variables (corresponding to individual variables in classical logic), $\wedge$ is a fact compounder, $\leq^{-1}$ (mutually inverse implication) is an empirical or mathematical connective. The boundness of a term variable in a first-order single empirical or mathematical connection proposition is determined by its occurrences relative to empirical or mathematical connective, fact compounder, predicate, and function. A term variable is relevantly bound if it occurs on both sides of the empirical or mathematical connective, such as the x in man(x) $\leq^{-1}$ mortal(x). A term variable is transitively bound if it occurs on one side of the empirical or mathematical connective but on both sides of a fact compounder, such as the y in parent(x,y)$\wedge$ancestor(y,z)$\leq^{-1}$ancestor(x,z). A term variable is additionally bound if it occurs on one side of the empirical or mathematical connective but on both sides of a binary predicate, such as the z in the elimination law of addition $x+z=y+z\leq^{-1}x=y$. A term variable is juxtaposed bound if it occurs on one side of a predicate but on both sides of a binary function such as the z in $x*x+y*y+z*z\leq 1\leq^{-1}x*x+y*y\leq 1$.

If a term variable occurs only once in a first-order single empirical or mathematical connection proposition, then it is free. Because it cannot be one of the above-mentioned bound variables. If a term variable occurs in a first-order single empirical or mathematical connection proposition just twice, then it is purely bound. Because it is just one of the above-mentioned boundness. For example, in parent(x,y)$\wedge$ancestor(y,z)$\leq^{-1}$ ancestor(x,z), x and z are purely relevantly bound, y is purely transitively bound. If a term variable occurs in a first-order single empirical or mathematical connection proposition three times or more, then it is combined boundness. Because it combines two or more of the above-mentioned boundness. For example, x in $x<y\wedge x<z\leq^{-1}x<y+z$ is combined relevant and transitive boundness. Because the first and second occurrences of x are transitively bound, the first and third occurrences of x are relevantly bound, the second and the third occurrences are relevantly bound.