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Generalization of FOLDS (First Order Logic with Dependent Sorts) in a hyperdoctrinal setting

FOLDS was introduced in M. Makkai: First Order Logic with Dependent Sorts, with Application to Category Theory (1995; www.math.mcgill.ca/makkai/), cited below as "FOLDS I", and M. Makkai: Towards a Categorical Foundation of Mathematics, in: Logic Colloquium '95, Lecture Notes in Logic 11, 1998; pp. 153-190. In an unpublished manuscript from 1998, henceforth cited as "FOLDS II", the theory is reworked and generalized. In the talk, I will give a description of some of the contents of FOLDS II, as well as present further related results. The main feature of FOLDS is the concept of "FOLDS equivalence". With any FOLDS signature L (a skeletal one-way category with finite fan-out), there is associated, among others, a relation on L -structures, called "L-equivalence". First-order statements on L -structures that are invariant under L-equivalence are, up to logical equivalence, precisely the ones that are formulated in the syntax of FOLDS (General Invariance Theorem (GIT); see FOLDS I). FOLDS II and the newer work contain a full treatment of the GIT, in the generalized context, for both classical and intuitionistic logic as well as infinitary extensions of first order logic. FOLDS II is formulated in a purely categorical language, in the spirit of M. Makkai: The Fibrational Formulation of Intuitionistic Predicate Logic, Notre Dame J. Formal Logic 1993, pp. 334-377 and 471-498. In FOLDS II, a logical theory is taken to be a "Q-fibration". In Appendix B of FOLDS I, the concept of Q-fibration is briefly discussed.