COMPARING VARIOUS APPROACHES TO LAMBDA-CALCULI FOR CLASSICAL LOGIC

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ABSTRACT. We introduce a research project which starts by a close comparisons of various approaches, in the frame of $\lambda-$calculus, to the computational content of classical logic. The natural (ideal) aim in these comparisons would be to investigate the possibility of a calculus which shares most of the good features of the various proposals. The number of different proposals being so big, we choose to consider just some of them: symmetric $\lambda-$calculus (Barbenera-Berardi), $\lambda\mu-$calculus (Parigot), $\overline{\lambda}\mu\widetilde{\mu}-$calculus (Curien-Herbelin), $\chi-$calculus (Urban, Van Bakel) and DualCalculus (Wadler). While a number of features are well known in each case (e.g. regarding Church-Rosser property, (strong) normalization, duality), we notice that some delicate points arise in translating/simulating a calculus into another one, especially when the target is inspired to natural deduction and the source is based on sequent calculus; usually, life is easier in the other direction. For instance, there are direct translations from $\lambda\mu-$calculus to $\overline{\lambda}\mu\widetilde{\mu}-$calculus; for the other way round, one approach by Rocheteau enlarges the original $\lambda\mu-$calculus by adding 'contexts' and rules which are not clearly in the natural deduction style. Another question is that of how to deal with negation in a frame like $\overline{\lambda}\mu\widetilde{\mu}-$calculus: once negation be present, it might be possible to interprete/ simulate the Dual Calculus into it.