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Reduction rules for intuitionistic $\lambda\rho$ -calculus. (English) [Zbl 1378.03012](#)

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Summary: The third author gave a natural deduction style proof system called the $\lambda\rho$ -calculus for implicational fragment of classical logic in [Tsukuba J. Math. 37, No. 2, 307–320 (2013; [Zbl 1280.03016](#))]. In [Intuitionistic fragment of the $\lambda\mu$ -calculus. Techn. Rep., Tokyo Institute of Technology (2015); “Intuitionistic tree sequent calculus and intuitionistic $\lambda\rho$ -calculus”, Post-proceedings of the RIMS Workshop “Proof Theory, Computability Theory and Related Issues” (to appear)], the fourth author gave a natural subsystem “intuitionistic $\lambda\rho$ -calculus” of the $\lambda\rho$ -calculus, and showed the system corresponds to intuitionistic logic. The proof is given with tree sequent calculus (Kripke models), but is complicated. In this paper, we introduce some reduction rules for the $\lambda\rho$ -calculus, and give a simple and purely syntactical proof to the theorem by use of the reduction. In addition, we show that we can give a computation model with rich expressive power with our system.

MSC:

03B40 Combinatory logic and lambda calculus

03B20 Subsystems of classical logic (including intuitionistic logic)

03F03 Proof theory in general (including proof-theoretic semantics)

Keywords:

$\lambda\rho$ -calculus; Curry-Howard isomorphism; intuitionistic logic; proof theory

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