Problem #78 (Solved !)

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Summary: Is there a calculus of explicit substitution that is both confluent and preserves termination?

There are confluent calculi of explicit substitutions, but these do not preserve termination (strong normalization) [CHL92, Mel95], and there are calculi that are not confluent on open terms, but which do preserve termination [LRD94]. Is there a calculus of explicit substitution that is both confluent and preserves termination?

Remark

The calculus presented in [Mu n96] enjoys both properties. This has led to Problem #88.

Bibliography

[CHL92] Pierre-Louis Curien, Thérèse Hardin, and Jean-Jacques Lévy. Confluence properties of weak and strong calculi of explicit substitutions. RR 1617, Institut National de Rechereche en Informatique et en Automatique, Rocquencourt, France, February 1992.

[LRD94] Pierre Lescanne and J. Rouyer-Degli. The calculus of explicit substitutions $\lambda\upsilon$. Technical Report RR-2222, INRIA-Lorraine, January 1994.

[Mel95] Paul-André Melliès. Typed λ-calculi with explicit substitutions may not terminate. In *Typed Lambda Calculi and Applications*, 1995.

[Mu n96] César Mu noz. Confluence and preservation of strong normalisation in an explicit substitutions calculus (extended abstract). In Edmund C. Clarke, editor, *Eleventh Symposium on Logic in Computer Science*, pages 440–447, New Brunswick, NJ, July 1996. IEEE.