

TLCA List of Open Problems

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Problem # 17

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Statement. Can recursive types be defined in system F ?

It was shown by Geuvers and Spławski that inductive types in the style of [Mendler, 1991] are definable in the polymorphic $\beta\eta$ -lambda-calculus. It is however an open question whether *recursive* types as in [Mendler, 1987] are also definable. In [Spławski and Urzyczyn, 1999] it is shown that system F with β -conversion only is not sufficient for this purpose. See also the paper [Regnier and Urzyczyn, 2001] and Problem 21.

References

- [Mendler, 1987] Mendler, N. (1987). Recursive types and type constraints in second-order lambda calculus. In *Logic in Computer Science*, pages 30–36. IEEE Computer Society Press.
- [Mendler, 1991] Mendler, N. (1991). Inductive types and type constraints in the second-order lambda calculus. *Annals of Pure and Applied Logic*, 51(1-2):159–172.
- [Regnier and Urzyczyn, 2001] Regnier, L. and Urzyczyn, P. (2001). Retractions of types with many atoms. Technical Report 29, IML Marseille. <http://arxiv.org/abs/cs/0212005>.
- [Spławski and Urzyczyn, 1999] Spławski, Z. and Urzyczyn, P. (1999). Type fixpoints: Iteration vs. recursion. In *International Conference on Functional Programming*, pages 102–113. ACM Press.