1 Labelled Transition System for repeated Head Linear Reduction

1.1 Notes

State is a tuple $\langle$ λ-term with underlined node, context, list of arguments $\rangle$, where

- λ-term (a tree; by considering λ-term as a tree it becomes possible to cross arguments out of tree ($\ldots$ *without term*)) with underlined node is a usual lambda term with one underlined position;
- context Γ is an unordered list of pair $(variable : term)$;
- list of arguments Δ is an ordere list of λ-terms. (one can also think about Δ as unordered list of pointers to the corresponding subtree)

1.2 Rules

1. (App)
   $\ldots_1 (e_1 \underline{@} e_2) \ldots_2 ;\ \Gamma;\ \Delta \longrightarrow \ldots_1 (\underline{e_1} @ e_2) \ldots_2 ;\ \Gamma;\ e_2 : \Delta$
2. (Lam–elim)
   $\ldots_1 (\underline{\lambda x}.e_1) \ldots_2 ;\ x : B,\ \Gamma;\ B,\ \Delta \longrightarrow \ldots_1 (\underline{e_1})(\ldots_2\ \textit{without } B);\ x : B,\ \Gamma;\ \Delta$
3. (Lam–non-elim)
   $\ldots_1 (\underline{\lambda x}.e_1) \ldots_2 ;\ x : B,\ \Gamma;\ \$,\ \Delta \longrightarrow \ldots_1 (\lambda x.\underline{e_1}) \ldots_2 ;\ \Gamma;\ \$,\ \Delta$
4. (BVar)
   $\ldots_1 \underline{x} \ldots_2 ;\ x : B,\ \Gamma;\ \Delta \longrightarrow \ldots_1 \underline{B} \ldots_2 ;\ x : B,\ \Gamma;\ \Delta$
5. (FVar–pause-0)
   $\ldots_1 (\ldots_2 \underline{x}) \ldots) @ B \ldots_3 ;\ (x : \_) \notin \Gamma;\ B,\ \Delta \longrightarrow \ldots_1 (\ldots_2 x) \ldots) @ \underline{B} \ldots_3 ;\ \Gamma;\ \$,\ \Delta$
6. (FVar–pause-1)
   $\ldots_1 (\ldots_2 \underline{x}) \ldots) @ B \ldots_3 ;\ (x : \_) \notin \Gamma;\ \$,\ B,\ \Delta \longrightarrow \ldots_1 (\ldots_2 x) \ldots) @ \underline{B} \ldots_3 ;\ \Gamma;\ \$,\ \Delta$
7. (FVar–pause-2)
   $\ldots_1 \underline{x} \ldots_2 ;\ (x : \_) \notin \Gamma;\ \$,\ \$,\ \Delta \longrightarrow \ldots_1 \underline{x} \ldots_2 ;\ \Gamma;\ \$,\ \Delta$
8. (FVar–stuck-0)
   $\ldots \underline{x} \ldots ;\ (x : \_) \notin \Gamma;\ \emptyset \longrightarrow$ THE END
9. (FVar–stuck-1)
   $\ldots \underline{x} \ldots ;\ (x : \_) \notin \Gamma;\ \$,\ \ldots,\ \$,\ \emptyset \longrightarrow$ THE END