In this document, κ is used to name continuations, μ is used to name meta-continuations, and δ is used to name continuation delimiters.

Meta-CPS conversion function:

$$\begin{array}{l}
\mathcal{M}[\![v]\!] = \lambda\kappa\mu.\, \kappa\, v\, \mu \\
\mathcal{M}[\![E_1\, E_2]\!] = \\
\quad \lambda\kappa\mu.\, \mathcal{M}[\![E_1]\!]\, (\lambda f \mu'. \\
\qquad\qquad\qquad \mathcal{M}[\![E_2]\!]\, (\lambda x \mu''.\, f\, x\, \kappa\, \mu'') \\
\qquad\qquad\qquad\qquad \mu') \\
\qquad\qquad\quad \mu \\
\mathcal{M}[\![\lambda v.\, E]\!] = \lambda\kappa\mu.\, \kappa\, (\lambda x \kappa' \mu'.\, \mathcal{M}[\![E]\!]\, \kappa'\, \mu')\, \mu
\end{array}$$

Auxiliary functions for `freset` and `freset`. $\mathcal{D}$ constructs a continuation delimited by the given delimiter. $\mathcal{A}$ pushes a new continuation onto the stack that the given delimiter is mapped to by the given meta-continuation.

$$\begin{array}{l}
\mathcal{D}\, \delta = \lambda x \mu.\, \text{case}\ \mu\, \delta\ \text{of} \\
\qquad\qquad\quad \kappa : s \longrightarrow \kappa\, x\, (\mu[\delta \longmapsto s]) \\
\qquad\qquad\quad \text{otherwise} \longrightarrow \\
\qquad\qquad\qquad \textit{wrong}\ \text{“outside delimited context”} \\
\mathcal{A}\, (\delta, \kappa, \mu) = \mu[\delta \longmapsto \kappa : \mu\, \delta]
\end{array}$$

$\mathcal{D}$ and $\mathcal{A}$ could both be trivially defined using only λ-terms, but it is clearer to write the explicit stack (list) and map notations. Either version could also be converted to meta-CPS, but note that $\mathcal{D}$ and $\mathcal{A}$ are not so much functions as notational conveniences for operations that are duplicated in the definitions of **fshift** and **freset**, so it would only serve to complicate all these definitions to meta-CPS-convert them or translate them to pure λ-terms or both.

Finally, **fshift** and **freset**, which correspond with `reify-composable-continuation` and `with-delimited-continuation`, respectively. There are pragmatic differences/extensions in what I plan to propose as a SRFI, which will be discussed in the full paper, but they are immaterial for now.

$$\begin{array}{l}
\textbf{freset} = \lambda\delta f \kappa\mu.\, f\, (\mathcal{D}\, \delta)\, (\mathcal{A}\, (\delta, \kappa, \mu)) \\
\textbf{fshift} = \\
\quad \lambda\delta f \kappa\mu.\, f\, (\lambda x \kappa\mu.\, \kappa\, x\, (\mathcal{A}\, (\delta, \kappa, \mu))) \\
\qquad\qquad\quad (\mathcal{D}\, \delta) \\
\qquad\qquad\quad \mu
\end{array}$$