$y_{i+1}^{(0)}$ is prediction from Euler method, $y_{i+1}^{(n)}$ are subsequent guesses

$$
\begin{aligned}
y_{i+1}^{(1)} &= y_i + \frac{\Delta t}{2}[f(y_i) + f(y_{i+1}^{(0)})] \\
y_{i+1}^{(2)} &= y_i + \frac{\Delta t}{2}[f(y_i) + f(y_{i+1}^{(1)})] \qquad \rightarrow \qquad y_{i+1}^{(2)} - y_{i+1}^{(1)} = \frac{\Delta t}{2}[f(y_{i+1}^{(1)}) - f(y_{i+1}^{(0)})] \\
y_{i+1}^{(3)} &= y_i + \frac{\Delta t}{2}[f(y_i) + f(y_{i+1}^{(2)})] \qquad \rightarrow \qquad y_{i+1}^{(3)} - y_{i+1}^{(2)} = \frac{\Delta t}{2}[f(y_{i+1}^{(2)}) - f(y_{i+1}^{(1)})] \\
&\vdots \qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad \vdots
\end{aligned}
$$

$$
\begin{aligned}
y_{i+1}^{(n+1)} - y_{i+1}^{(n)} &= \frac{\Delta t}{2}[f(y_{i+1}^{(n)}) - f(y_{i+1}^{(n-1)})] \qquad \frac{df}{dy} \approx \frac{f(y_{i+1}^{(n)}) - f(y_{i+1}^{(n-1)})}{y_{i+1}^{(n)} - y_{i+1}^{(n-1)}} \\
y_{i+1}^{(n+1)} - y_{i+1}^{(n)} &= \frac{\Delta t}{2}\frac{df}{dy}[y_{i+1}^{(n)} - y_{i+1}^{(n-1)}]
\end{aligned}
$$

If $\left|\dfrac{y_{i+1}^{(n+1)} - y_{i+1}^{(n)}}{y_{i+1}^{(n)} - y_{i+1}^{(n-1)}}\right| > 1$, corrector will not converge

system diverges if $\quad \Delta t > \dfrac{2}{|df/dy|}, \qquad \dfrac{df}{dy} = \dfrac{\cos y}{\sqrt{y}} - \dfrac{\sin y}{2y^{3/2}}$

maximum value for $y > 1 : |df/dy|_{\max} = 0.5992425...$ occurs at $y = 2.759363...$

system converges for $\Delta t \lesssim 3.3375$