



Classical Mechanics and Special Relativity

Course # PHY 204

Fall 2020

Prepared by
Abu Mohammad Khan

Aitken Acceleration

$$f(x_k) = x_k^2 - 2x_k e^{-x_k} + e^{-2x_k} \longrightarrow \textcircled{1}$$

$$x_{k+1} = x_k - \frac{x_k^2 - 2x_k e^{-x_k} + e^{-2x_k}}{2x_k - 2e^{-x_k} + 2x_k e^{-x_k} - 2e^{-2x_k}} \longrightarrow \textcircled{2}$$

$$\hat{x}_{k+2} = x_k - \frac{(x_{k+1} - x_k)^2}{\underline{x_{k+2} - 2x_{k+1} + x_k}} \longrightarrow \textcircled{3}$$



$$\underline{x_0} \xrightarrow{eq 1} f(x_0) \xrightarrow{eq 2} \underline{x_1} \xrightarrow{eq 1} f(x_1) \xrightarrow{eq 2} \underline{x_2} \xrightarrow{eq 1} f(x_2)$$

$$\begin{array}{l} \underline{x_3} \xleftarrow{eq 2} \underline{f(\hat{x}_2)} \xleftarrow{eq 1} \underline{\hat{x}_2} \xleftarrow{eq 3} \end{array}$$

$$\begin{array}{l} \xrightarrow{f(x_2)} x_4 \xrightarrow{f(x_4)} \hat{x}_4 \xrightarrow{f(\hat{x}_4)} \end{array}$$

$$\begin{array}{l} \leftarrow x^f \end{array}$$



k	x_k	$f(x_k)$	$ f(x_k) < 10^{-5}$	
0	1 $\xrightarrow{g(1)}$	0.399576	NO	<u>Am.in</u>
1	$\downarrow g(2)$ 0.768941 $\xrightarrow{g(2)}$	0.093292	NO	$f(\hat{x}_n) \approx 0$
2	0.664590	0.022532	NO	became
\wedge	$\downarrow g(3)$			it is 10^{-5}
2	<u>0.578651</u>	$\rightarrow 3.2 \times 10^{-4}$	NO	less than 10^{-5}
3	\downarrow 0.572885	$f(x_n) = 8 \times 10^{-5}$	NO	
4	0.570011	$f(x_n) = 2 \times 10^{-5}$	NO	$ x - \hat{x}_n $
$\xrightarrow{g(3)}$	<u>0.567154</u>	$f(\hat{x}_n) = 2.8 \times 10^{-10} < 1 \times 10^{-5}$	YES	<u>$= 1.1 \times 10^{-5}$</u>

