



Runge–Kutta–Verfahren 4. Ordnung

Butcher–Block:

0				
1/2	1/2			
1/2	0	1/2		
1	0	0	1	
	1/6	1/3	1/3	1/6

$$\rightarrow \Phi = \frac{1}{6} f^{(1)} + \frac{4}{6} f^{(2)} + \frac{2}{6} f^{(3)} + \frac{1}{6} f^{(4)}$$

$$f^{(1)} = \begin{pmatrix} \phantom{f(t, \mathbf{x})} \\ \phantom{f(t, \mathbf{x})} \\ \phantom{f(t, \mathbf{x})} \\ \phantom{f(t, \mathbf{x})} \end{pmatrix}$$

$$f^{(2)} = \begin{pmatrix} \phantom{f(t, \mathbf{x})} \\ \phantom{f(t, \mathbf{x})} \\ \phantom{f(t, \mathbf{x})} \\ \phantom{f(t, \mathbf{x})} \end{pmatrix}$$

$$f^{(3)} = \begin{pmatrix} \phantom{f(t, \mathbf{x})} \\ \phantom{f(t, \mathbf{x})} \\ \phantom{f(t, \mathbf{x})} \\ \phantom{f(t, \mathbf{x})} \end{pmatrix}$$

$$f^{(4)} = \begin{pmatrix} \phantom{f(t, \mathbf{x})} \\ \phantom{f(t, \mathbf{x})} \\ \phantom{f(t, \mathbf{x})} \\ \phantom{f(t, \mathbf{x})} \end{pmatrix}$$

Algorithmus:

$$\dot{\mathbf{x}} = \mathbf{f}(t, \mathbf{x}), \quad \mathbf{x}(t_0) = \mathbf{x}_0$$

