

Another popular scheme is the implicit trapezoidal method (IT):

$$k_1 = f(t_j, y_j)$$

$$\underline{k_2} = f(t_{j+1}, y_j + \frac{h}{2}(k_1 + \underline{k_2}))$$

$$y_{j+1} = y_j + \frac{h}{2}(k_1 + k_2)$$

Sometimes written as

$$y_{j+1} = y_j + \frac{h}{2} \left(f(t_j, y_j) + f(t_{j+1}, y_{j+1}) \right)$$

Clearly looks like the trapezoidal rule and hence the name!

Both IM and IT have order of accuracy $p=2$.