Selected Topics in CFD - list 3

Paweł Jędrejko

October 2025

1.

Propose locally 2nd-order adaptive-step Runge-Kutta algorithm. Check if, for your implementation, the numerical solution is approximately within the selected error tolerance. For that purpose, use the logistic equation:

$$\dot{y} = y - y^2$$

which solution is:

$$y(t) = \frac{e^t}{C + e^t}.$$

2.

Implement the 3rd order analogue (Bogacki–Shampine) and compare the number of right-hand side function evaluations for the same tolerance.