ITMO UNIVERSITY

ROBOTICS AND ARTIFICIAL INTELLIGENCE

Course: Simulation of Robotic System

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Practice Question: Task1

1. Look in the table and find yourself:

2. Look in the "Integrators.ipynb" file and use these functions for your task.

3. Solve analytically the ODE in the form of: $a \cdot x + b \cdot x + c \,.\, x = d$

4. From the list take coefficients of your ODE and solve them with three integrators:

- Explicit/Implicit Euler, Runge-Kutta methods

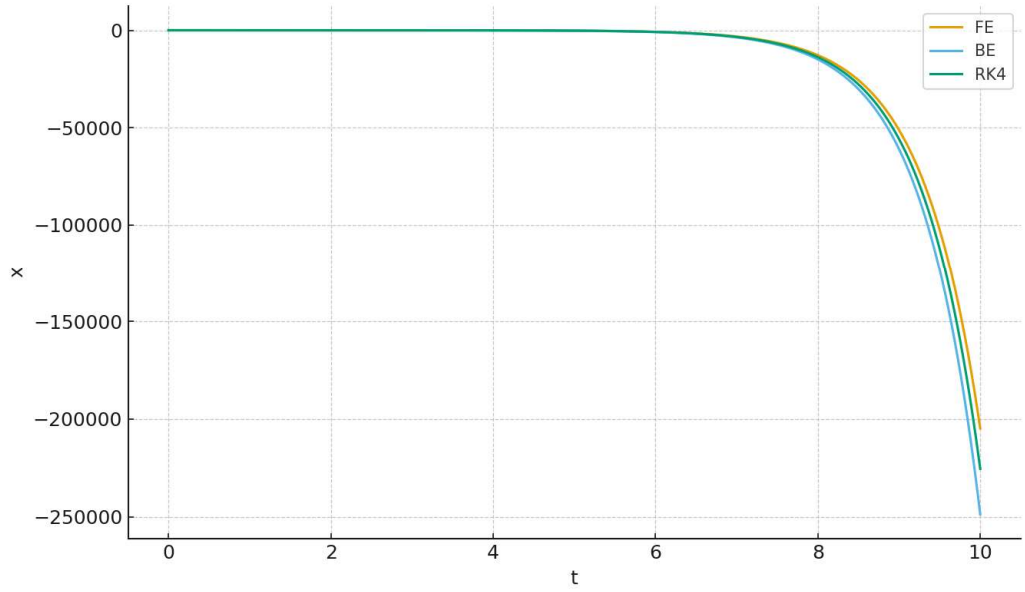
5. Compare results of these methods with analytical solution, discuss and conclude your thoughts in the .pdf report.

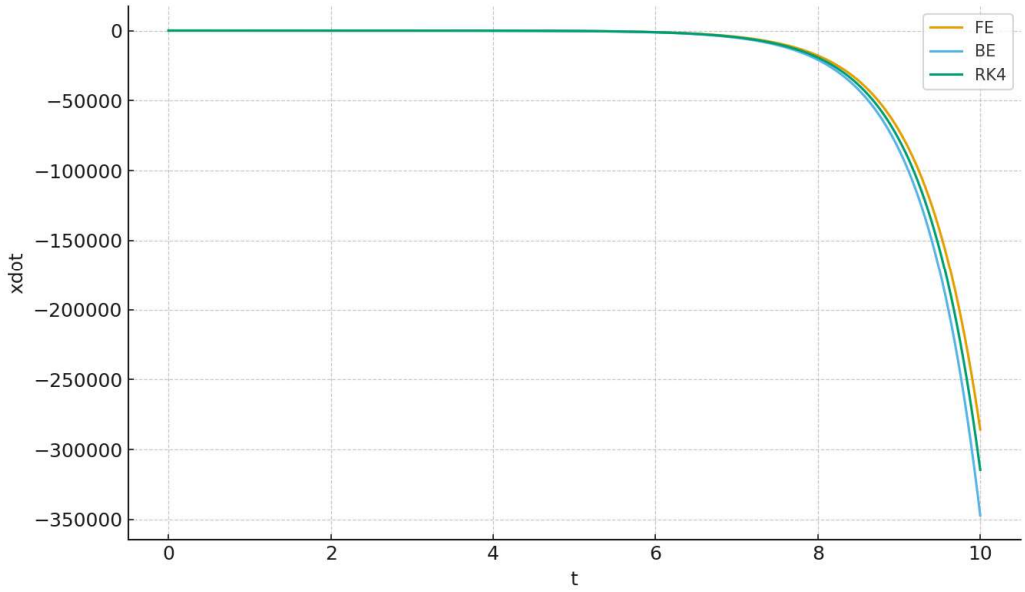
6. Name of the report should be "Your_ISU_number_YourName_task1.pdf"

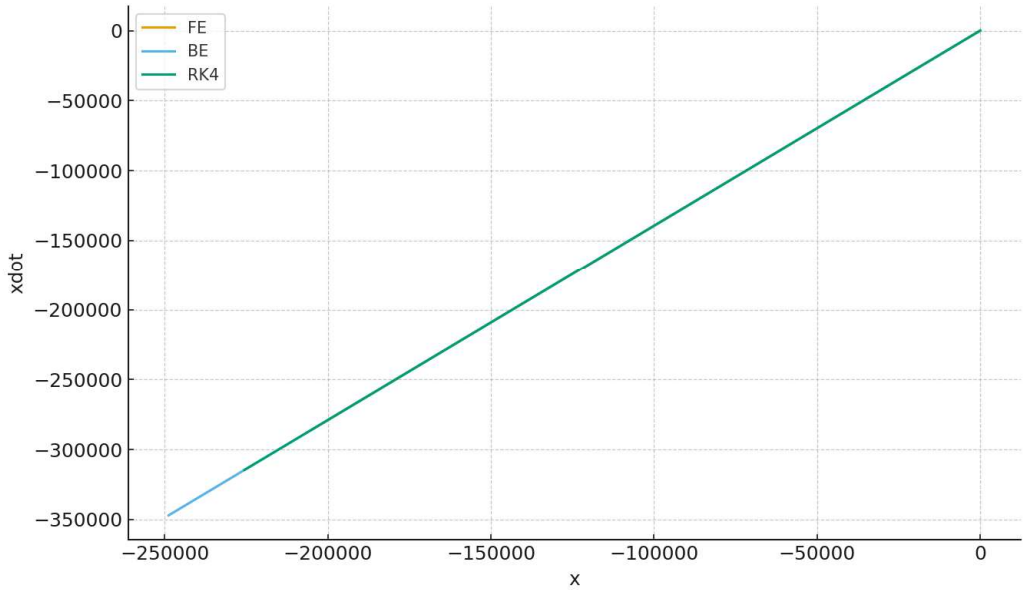
REPORT

Linear ODE: ax" + b x' + c x = d

Coefficients used: a = -4.73, b = 1.41, c = 7.24, d = 3.96







CONCLUTION

RK4 is the most accurate for this time step and problem setup.

Forward Euler shows larger amplitude and phase errors.

Backward Euler is more stable but introduces numerical damping.

FE=1.208216e+04

BE=1.352438e+04,

RK4=5.714218e-04