UNIVERSITY OF OSLO

COMPUTATIONAL PHYSICS

Project 5

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`https://?????`

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ABSTRACT

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2 METHOD

The source codes for the algorithms described in this chapter can be found in the Github folder `https://?????`. [1]

2.1 Newtonian two-body problem in three dimension

Skriv her into til section om RK4 and Verlet method to solving 2 body problem in 3 D.

$\mathbf{r}(t)$ is the three-dimensional space vector consisting of the coordinated $(x(t), y(t), z(t))$, whilst $\mathbf{v}(t)$ is the three-dimensional velocity vector with coordinates $(v_x(t), v_y(t), v_z(t))$, both of which are dependent on time.

2.1.1 Fourth Order Runge-Kutta Method

- Remember to write about accuracy of algorithm!!

2.1.2 Velocity-Verlet method

- Remember to write about accuracy of algorithm!!

$$\mathbf{r}(t+\delta t) = \mathbf{r}(t) + \mathbf{v}(t)\delta t + \frac{1}{2}\mathbf{a}(t)\delta t^2 \tag{2.1}$$

$$\mathbf{v}(t+\delta t) = \mathbf{v}(t) + \frac{1}{2}(\mathbf{a}(t) + \mathbf{a}(t+\delta t))\delta t \tag{2.2}$$

The velocity is in the algorithm calculated [2] by first calculating

$$\mathbf{v}_{part1}(t+\delta t) = \mathbf{v}(t) + \frac{1}{2}\mathbf{a}(t)\delta t \tag{2.3}$$

[1] FiXme Note: fix these lines
[2] FiXme Note: ad to gange

and then use ?? [3] to determine $\mathbf{a}(t+\delta t)$, which is then used to compute the remaining term of Eq. (2.2) as

$$\mathbf{v}_{part2}(t+\delta t) = \frac{1}{2}\mathbf{a}(t+\delta t)\delta t \tag{2.4}$$

[3] FiXme Note: fix this!

CHAPTER

3 RESULTS AND DISCUSSION

The results from running the codes described in Chap. 2 for computing the blah blah blah ?? can be found in the GitHub folder `https:/??`, together with the MatLab scripts for the plots presented in this chapter. [1]

[1] FiXme Note: fix these lines

CHAPTER

4 CONCLUSION

BIBLIOGRAPHY