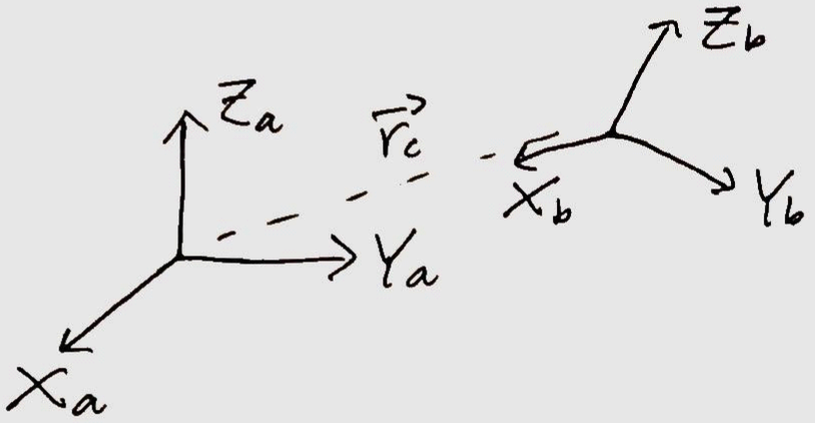
TTK4130 Modeling and Simulation
Assignement 3
Ingebrigt Stamnes Reinsborg

1)



$$X = \begin{bmatrix} \vec{r_c} \\ \vec{v_c} \\ R_b^a \\ \vec{\omega} \end{bmatrix}$$

~~Skal ikke være~~ 1×18-matrise should be

R_b^a reshape ~~til~~ 1×9

$$\dot{v}: \quad mI\, a_c^b = F_{bc}^b$$

$$\Rightarrow \dot{v}_c^b = -\frac{G m_T}{\|r_c\|^2} \cdot \frac{r_c^a}{\|r_c\|}$$

$$\dot{\omega}: \quad M_{b/c}^b \alpha_{ib}^b + (\omega_{ib}^b)^\times M_{b/c}^b \omega_{ib}^b = T_{b/c}^b$$

$$\left(\frac{1}{6} m l^2 I\right) \alpha_{ib}^b = -(\omega_{ib}^b)^\times \left(\frac{1}{6} m l^2 I\right) \omega_{ib}^b$$

$$\dot{R}_b^a = \dot{R}_b^a = R_b^a (\omega_{ab}^b)^\times$$

$$\dot{r} = v$$

We implemented this in MatLab, see code for 1a and 1b. Should be in a Zip-folder.

The results for a) are reasonable. The satellite rotates around it perfectly, but its in free fall because we didn't know how to implement it being in a perfect orbit.

The results for b) are also reasonable. Since the centre of mass has been displaced slightly we have to look at the paralell-axis theorem, which in practice tells us that the satellite will "wobble" sort of back and forth, which is what we observed.

2) We could not reasonably finish this task, but we hope that there should be enough in task 1 to get this approved.

Also, we would really appreciate maybe having a session each week ~~xxxx~~ where material related to the assignements is presented; maybe giving us some pointers in how we should proceed in solving the tasks, especially those related to MatLab.