

Homework 6

ASE 366L

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CJL3282

1)

$$1) \frac{d\bar{r}}{du} = -\frac{3a^3 m_0}{2r^3 \rho_{0m}} \cdot (\cos \sin \omega(z_0 - r) \chi_{m0-r})$$

$$1.1) \frac{d\bar{r}}{du} = \frac{1}{2} \int_0^{2\pi} -\frac{3a^3 m_0}{2r^3 \rho_{0m}} \left(\begin{array}{l} + \cos \sin^2 u \sin(z_0 - r) \\ - \end{array} \right) \cdot \left(\begin{array}{l} (1) \\ (2) \end{array} \right) du$$

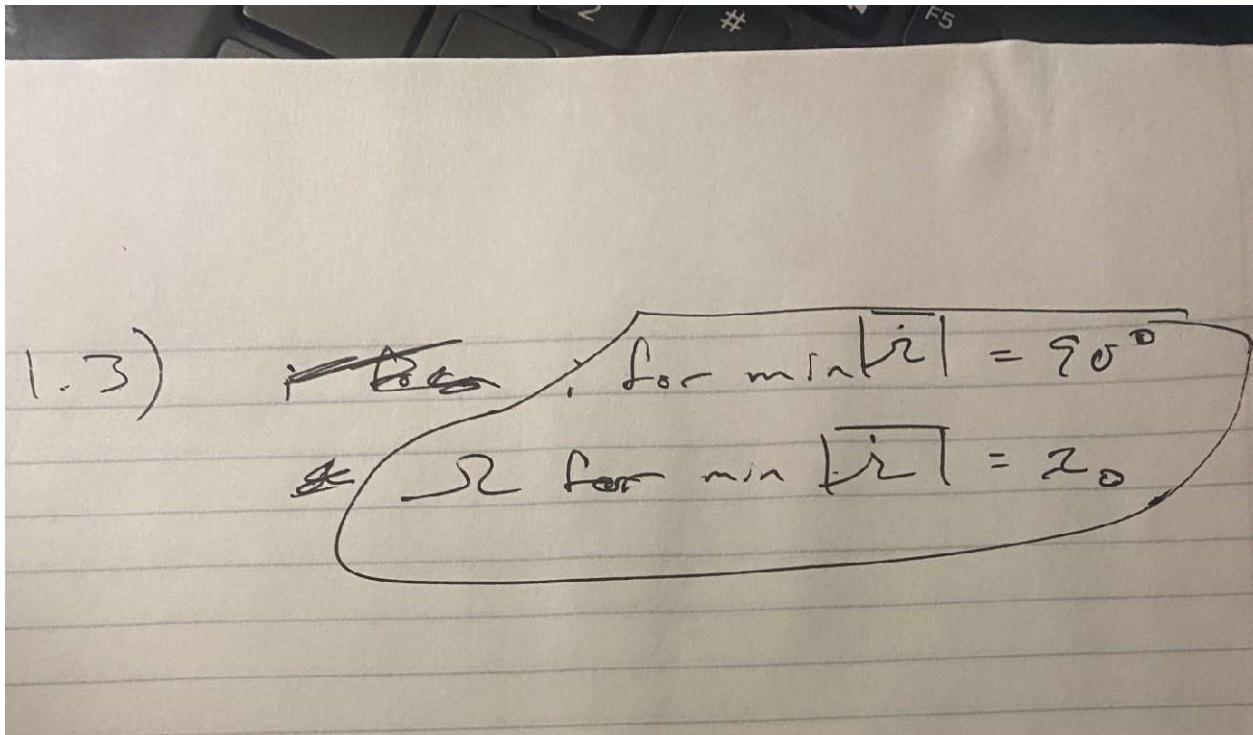
$$= -\frac{1}{2} \underbrace{\frac{3a^3 m_0}{2r^3 \rho_{0m}}}_{\text{constant}} \int_0^{2\pi} \left(\begin{array}{l} (1) \\ (2) \end{array} \right) \cos(z_0 - r) \sin(z_0 - r) du$$

$$= \boxed{-\frac{1}{2} \cdot \frac{3a^3 m_0}{2r^3 \rho_{0m}} \cos \sin^2(z_0 - r)} \cdot \frac{1}{2\pi} \int_0^{2\pi} \cos \sin \omega du + \cos \sin^2(z_0 - r) \cdot \int_0^{2\pi} \sin \omega du$$

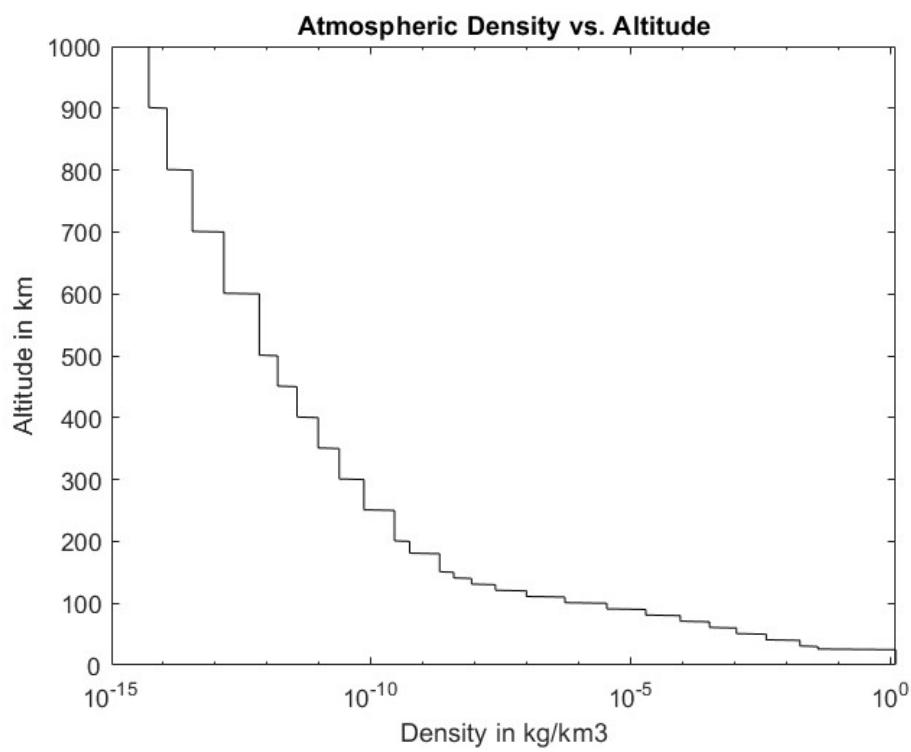
$$1.2) \bar{r} = \frac{d\bar{r}}{du} \cdot u = \frac{d\bar{r}}{du} \cdot \bar{u}$$

$$\bar{r} = \frac{3a^3 m_0}{4r^3 \rho_{0m}} \cos \sin^2(z_0 - r) \sqrt{\frac{m_0}{\omega}}$$

$$\boxed{\bar{r} = \frac{-3m_0}{4r^3 \rho_{0m}} \cos \sin^2(z_0 - r) \sqrt{\frac{m_0}{\omega}}}$$

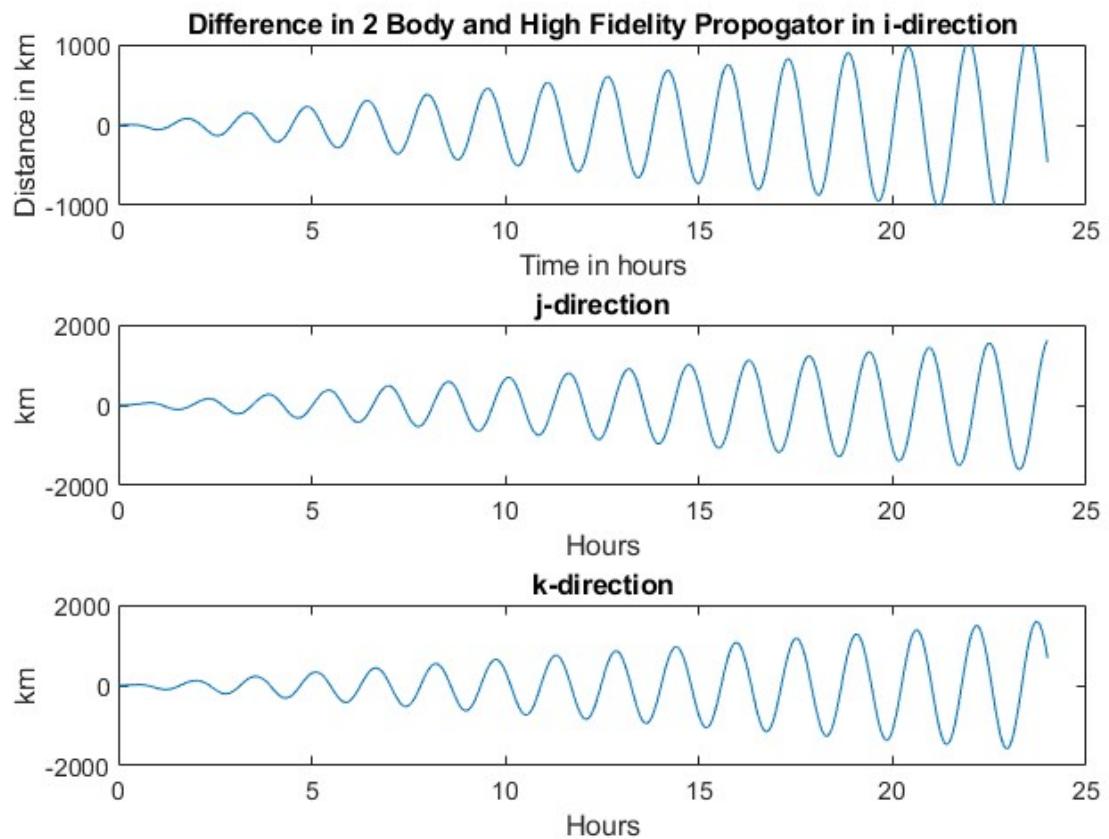


- 2) $\mathbf{ap} = 1.0e-05 * [0.0177 \quad 0.8845 \quad 0.0281]$
- 3) $\mathbf{asrp} = [-1.1000101008235e-11, -6.8539597139087e-10, 4.6486749696834e-12]$
- 4)



- 5) Position vector after 24-hour propagation:
 $[-3.3688560252807e+03, 2.4132243409221e+03, -5.4577801900539e+03] \text{ km}$

Velocity vector after 24-hour propagation:
[1.7593040886166, -6.2915386405959, -3.8827784973974] km/s



The plot shows the differences between the 2 body and high fidelity propagator in each positional direction.