Finally, $\rho(\tau)$ has the graph

That is $\rho > 0$ and $\dot{\rho} < 0$ when $t$ is slightly before $\tau$. Therefore, the cosmonaut sees the lens cap coming toward him when he is facing away from the earth.

f) Now consider general initial conditions:

Integrating (A6) gives

$$\dot{\psi} + 2(\omega/R) \rho = \cos t = \alpha. \quad (A10)$$

Putting this in (A5) gives

$$\ddot{\rho} = 3\omega^2 \rho + 2\omega R [-2(\omega/R) \rho + \alpha], \quad \text{or}$$

$$\ddot{\rho} = -\omega^2 \rho + 2\omega R \alpha. \quad (A11)$$

This equation has the solution

$$\rho = \frac{2RA}{\omega} + \beta \cos(\omega t + \gamma) \quad (A12)$$