

Homework - 7 Astronomy 400 B

Ritvik Basant

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1 Questions

1. How do the plots compare?

Initially, the plot for the current homework matches quite closely with the one from HW 6. However, as time passes, current HW's plot starts to differ significantly from that of the previous homework. Moreover, the previous plot (HW6) has multiple peri and apo centers. On the other hand, the plot for this homework only has one pericenter and one apocenter. When I plotted the orbit for 12 Gyrs instead of 10 Gyrs, the current homework's plot did seem to form another pericenter. So I believe that both plots are somewhat similar but current HW's plot seems to do that oscillatory motion on a longer timescale.

2. What missing physics could make the difference?

As the plot for the current homework seems to perform a sort of oscillatory motion (same as in HW 6) with a longer timescale, I think that this code, created in HW 7, misses the effects of dynamical friction. Moreover, as we have ignored the effects of the Milky Way galaxy on both M31 and M33, the code in this homework assignment gives a different plot in comparison to that of in HW 6, and thus it constitutes a second reason for the differences in both the plots.

3. The MW is missing in these calculations. How might you include its effects?

To include the effects of MW on current orbit simulation, we can add the gravitational potential of the MW galaxy into the current code, i.e., add the acceleration term from MW in equation 8 (from HW) where we estimate the new velocity. This could be done using the same method as we did for calculating the acceleration for M31 and M33.