About Classwork 12

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(Dated: December 9, 2018)

I. ABOUT

In this assignment we observed a ball of mass m with the horizontal coordinates x rolling into a potential of $V(x) = x^4/4 - x^2/2$ and this is known as sombrero. This produces the force $f_{\text{hat}}(x) = -V'(x) = -x^3 + x$ on the ball. The ball will also experience a drag force $f_{\text{drag}}(\dot{x}) = -\nu\dot{x}$. These forces would make the ball stop at some point.

Solution. In this assignment we used fourth order Runda Kutta for $m = 1$, $\nu = 0.25$, and $\omega = 1$. □

II. ANALYSIS

Using the fourth order Runga Kutta method, we could plot the position of the ball verses its velocity. As the force increases, the graph gains more points. This observation is shown in the figures below. The first has a Force value of 0.18. The second has a force value of 0.4.

III. CONCLUSIONS

From that we know that the fourth order Runga Kutta gives very accurate results in computing differential equations. The motion of the ball starts out a messy, but eventually calms and follows a pattern.

FIG. 1. Graphical representation of the sombrero potential with a Force value of 0.18.

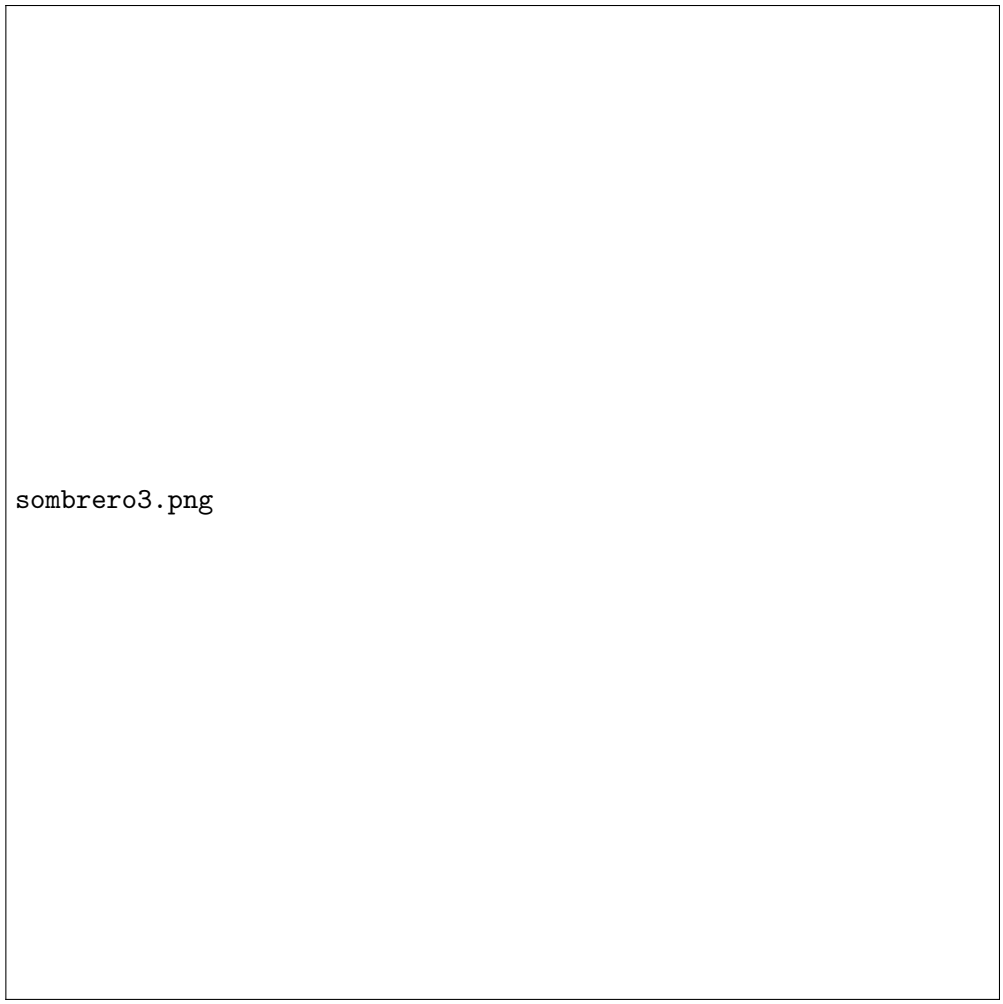

FIG. 2. Graphical representation of the sombrero potential with a Force value of 0.4.