## ADVANCED PHYSICS CLUB

OCTOBER 21, 2018

## Today's meeting

Today we discussed the basics of harmonic motion. We reviewed the equation

$$
m a=-k\left(x-x_{0}\right)
$$

- Writing the general solution as $x-x_{0}=A \sin (w t)+B \cos (w t)$ vs $x-x_{0}=A \sin (w t+\phi)$
- The notions of period, frequency.
- Why this is a good approximation in many cases. What if $k<0$ ? We wrote down the general solution and discussed it.


## Discussed problems

1. Consider a spring with coefficient $\frac{1}{2} \frac{\mathrm{~kg}}{\mathrm{~s}^{2}}$ and mass 1 kg attached to it, at rest. Somebody kicks the mass and imparts velocity to it, $2 \mathrm{~m} / \mathrm{s}$. What will be the amplitude and period of the motion?
2. Same spring and mass as before, but now the mass is pulled to distance of $2 m$ from the equilibrium point and released. After how much time is the maximum velocity reached? What would be the value of that velocity?

## Homework

1. Consider the system in the figure and assume that the cross section is uniformly $A$ everywhere. What is the frequency of small oscillations about the equilibrium in the figure?

