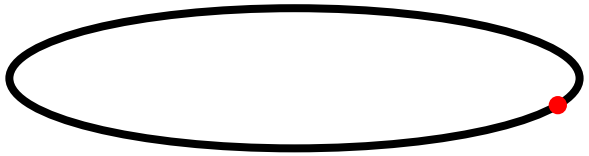
Alternative Method to getting UAVs to fly around on sphere surface



Have each UAV follow a different virtual point that travels in a circular orbit. Use a parametric formula for determining the location of the virtual point on the circle in the xy plane:

$$x = -R \cdot sin(2 \cdot \pi \cdot u) \quad y = R \cdot cos(2 \cdot \pi \cdot u) \quad z = 0$$ (u ranges from 0 to 1)

We make the virtual point move around the circle by changing the value of **u**. Lets have the virtual point move at a speed of ~10 m/sec. The circumference of the circle is $C = 2\pi R \approx 60\ m$. So the virtual point should make one revolution every 6 seconds. We are using a time step of 100 msec so it takes 10 steps to equal a second, so in 6 seconds there will be 60 time steps. This means that **u** should change by 1/60 every time step.

There are 15 UAVs so we can have 15 different circular orbits by rotating the results from the equations above by different amounts. You divide 180 degrees by 15 to get 12 degree separation between orbits. So $\Theta_1 = 0, \Theta_2 = 12, \Theta_3 = 24, \ldots \Theta_{15} = 168$.

$$x' = x \qquad y' = y \cdot cos\Theta - z \cdot sin\Theta \qquad z' = y \cdot sin\Theta + z \cdot cos\Theta$$

Instead of using Hooke's law to bind to the surface you use it to bind to the virtual point. The direction of the force is always from the location of the UAV to the virtual point. In this method there are only two forces (1) force of gravity, (2) force attracting UAV to virtual point.