

1 Code

```
1 from pysph.sph.equation import Equation
2
3 class BlackHole2D(Equation):
4     def __init__(self, dest, sources, soft=0.05, t_hit=5.0, M=1.0):
5         self.soft = soft # softening length to not divide by zero
6         self.t_hit = t_hit # time when the black hole crosses the origin
7         self.M = M # mass of black hole
8         super(BlackHole2D, self).__init__(dest, sources)
9
10    def initialize(self, d_idx, d_au, d_av):
11        d_au[d_idx] = 0.0
12        d_av[d_idx] = 0.0
13
14    # calculate the force due to the black hole
15    def loop(self, d_x, d_y, d_idx, d_au, d_av, t):
16        if(t > 10.0):
17            d_au[d_idx] += -self.M * d_x[d_idx] / pow((d_x[d_idx]**2 + self.
18            soft**2 + (d_y[d_idx] + t - self.t_hit)**2),3.0/2.0)
19            d_av[d_idx] += -self.M * (d_y[d_idx] + t - self.t_hit) / pow((d_x[
20            d_idx]**2 + self.soft**2 + (d_y[d_idx] + t - self.t_hit)**2),3.0/2.0)
```

Figure 1: Class for adding the acceleration due to the primordial black hole.