

Topic -- Implementation of particle system from Water fountain.

Name-Tarun Kumar Sahu(tks160330)

Summary

Description- A water fountain model contains tiny water droplets coming out of fountain nozzels.

Since they have initial velocity and angle of projection their trajectories can be calculated before hand. That is their position with time is known. Since the gravity force is acting on it throughout the motion of droplet, it experience drag force from the air too which slows down the velocity of particle. The drag force on water droplets are proportional to the size of droplets. And when it hit ground it bounces back with some energy lost to ground.

Importance- Since ordinary water fountain implementation is only based on projectile motion of body. Since it is independent of mass, every size droplets have same motion which looks very unrealistic. Adding drag force and friction force adds more realism to the model, and the bouncing effect causes the model to look more realistic with full time period of waters activity duration.

Proposal-

My proposal is to use drag force equation –

$$D = C_d * A * (0.5) * (\rho) * v * v$$

to be applied on water droplets to have different force on different size water droplet to have more dynamism to the whole particle model.

Using different size water molecules from the nozzle using random function. Different inclination of projectile also can create more realistic look .

For damping effect using the collision with elastic coefficient to allow the energy loss.

Relation to Computer Animation.

For different animation effects where model is composed of tiny liquid particles which passes through the less dense medium. Usually air, the effect can be applied to have more realistic effects, rather than just have flat image rolling. For example in natural water fountains falling from cliff can be implemented using this way to have more realistic look.

Goals-

Goal of the project is to implement water particle system with appropriate natural forces applied on it from air, ground and friction from nozzle.

Goal 1- Building the model of fountain with nozzle.

2- Ejecting water droplets of different sizes at random at angle with slight difference. in all direction.

3. Calculating the equation of motion of droplet till it hits the ground.

4. Applying drag for on it and then changing the trajectory of the particle

5. Before landing, calculating the speed of the droplet and then applying collision equation.

6. Further bouncing trajectory of droplet till it loses all its energy.

Work BreakDown

1st week – Building outer model of fountain, eg the fountain pot. Nozzle , ground and other surrounding objects.

2nd week – Createing the water particle system with buffer of unused particles, particles in motion , particles on gound, generation of them at random.

3rd week – Applying forces on them like gravitational force, drag force. Calculating trajectory of motion at each instance of time, since it changes due to drag force.

4th week –

Putting up final touch up, adding any implentation if can for inter particle collsion.