A:M Newton Physics a simple introduction

General assumtions

These are the basic assumptions Ive made when writing this guide. You can get the latest A:M version off the www.hash.com and the latest version of the newton plugin off of www.sgross.com/plugins.

- ☞ Animation Master V12.0+
- ☞ Newton Physics plugin V0.3+ (July, 7 2005 ver)

Part I Dynamic Objects

There are three types of objects in the Newton plugin. **Static objects**, objects that dont move. **Static Action objects**, are objects that move because of an user animated action. **Dynamic objects**, are objects that move because of physical interactions, either with other objects in the simulation.

First we're going to create some simple falling dynamic objects and watch them bounce around.

1 **Lathe a cone**. Peak the top and bottom so they're nice and flat. Now scoot the model down so that the center of **middle** of the model is at the **0,0,0** location. ***Don't make your models too small,*** the physics engine doesnt deal well with smaller objects.

2 Now expand the object's properties, and expand the '**plugin-properties**' and the '**Newton dynamics' triangle**. (fig2)

3 Turn **on** the **Use in simulation**, which means (obviously) that the object should be used in the physical simulation.

4 Set the '**Use As**' to **Dynamic** object.

5 **Density** is a number between 1 and 1000 with 1 being as dense as water and 1000 some other super dense material. Lets set it to **128**.

6 Leave the other settings alone for now. And **create** a blank **choreography**.

7 Select the **ground** object that was just created, and **expand** its **properties** and its plugin settings and Newton Dynamics settings and set, **Use in simulation to ON,** and **Use as** should be **static object** (since it wont be moving) you don't have to worr about density for static objects, they're already set to infinity.

8 **Drop** 3 copies of the **cylinder** object into your **choreography** and arrange them like figure 3. *NOTE: make sure they are not interesecting the ground*

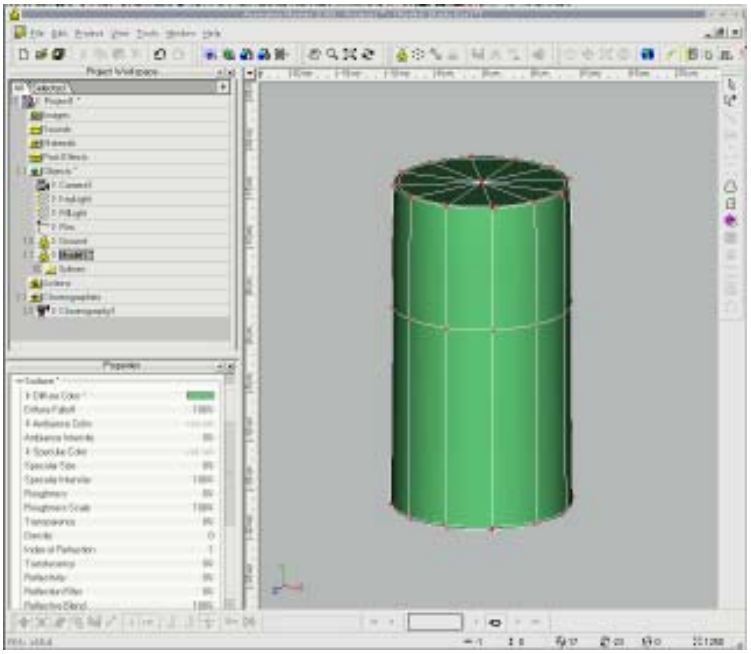

fig1. make a simple cylinder

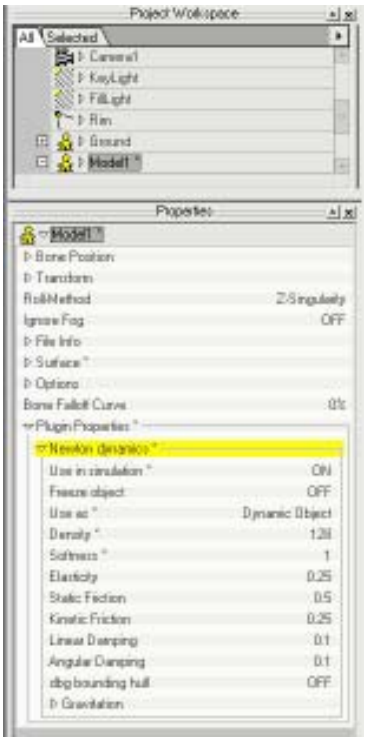

fig 2. set up the object's properties

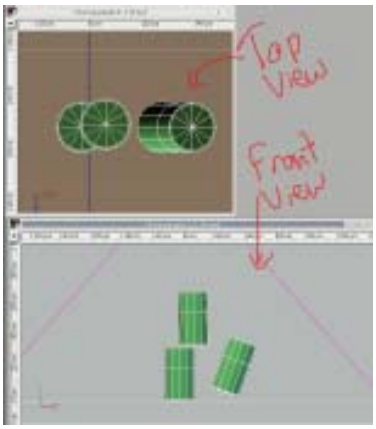

fig3. arrange in the chor

9 **Save your project.** Always save your project before you run the simulation, that way if it doesn't work you can go back the the previous version easily. Make it a habit.

10 **Select** one of the **cylinders** and then **right click** on it, **> wizards > Newton Physics** (fig 4)

11 Set the start and **end** time to 00:00:00 and **00:02:00** repsectively. (fig 5)

12 Click the '**OK**' button.

13 A:M should then do some math for couple seconds and when its done you can **scrub along the timeline** and see the action. If it works s**ave your project**.

14 Problems? *if your items don't move at all there might be a problem with the location of the objects' starting position. Check to make sure they're not intersecting each other. If you still have problems Check the Basic Troubleshooting section at the end of this guide for a couple tips.*

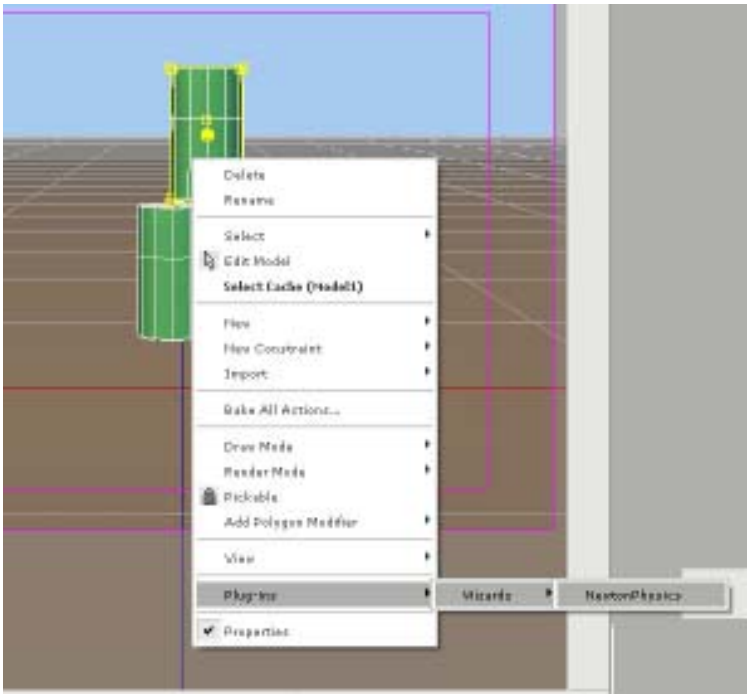

Fig 4, start the plugin

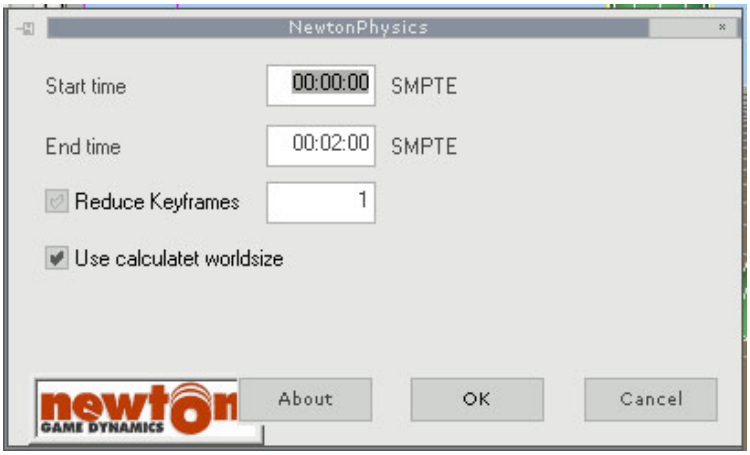

Fig 5, configure the plugin

Part II Static Action Objects

1 *(I am assuming you did the first part of this guide already)* **Create** a new **choreography**.

2 **Create** a new object and lathe a **sphere** in it.

3 **Select 1/4 the splines** in it and create a **new group** and rename it '**Newton_1**' Then create 3 other newton groups each from another quarter of the sphere. **(see fig7)**

Note:

The Newton_# groups in your model get their own convex hull (that's a collision model) dynamically created by the render. This improves the collision detection of your model. (if you want to see the collision hull that's created under the object's plugin properties you can turn 'dbg Bounding Hull' to ON. That will create a new object in your project with a copy of your model's collision surfaces, so you can check to see if they are good enough. *Also note that static objects (not static action) wont ever need a Newton_ group, they are genereated a fitted hull automatically.* ok on with it.

4 Set the **sphere**'s **plugin properties** (not the group, use the whole object) as in **figure 7**.

5 **Place** 3 instances of your **columns** standing upright just above the ground. This time we will make a static atcion object knock them over. So **add** a copy of your **sphere** to the choreography. Make it all look something like **figure 8**.

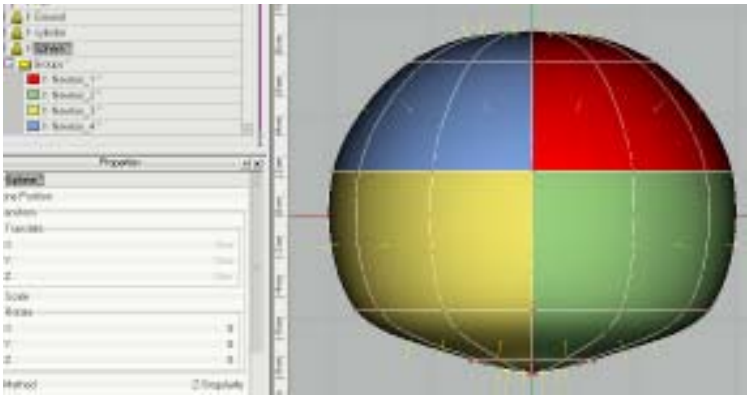
Fig 7, setup the Newton_ groups

6 **Save your project.** Always save your project before you run the simulation, that way if it doesn't work you can go back the the previous version easily. Make it a habit. Am I repeating myself?

7 Lets give your ball object some action. Create another keyframe at 00:02:00 with the ball having moved to the right, through all the cylinders.

7 **Select** an object and then **right click** on it, **> wizards > Newton Physics** (fig 4 if you don't remember)

8 Set the start and **end** time to 00:00:00 and **00:05:00** repsectively. (fig 5) and turn on the reduce keyframes (leave it at 1)

9 Click the '**OK**' button.

13 A:M should then do some math for couple seconds and when its done you can **scrub along the timeline** and see the action. Its not real pretty just some stuff scooting along but hey its just an example. If it works **save your project**.

14 Problems? *if your items don't move at all there might be a problem with the location of the objects' starting position. Check to make sure they're not intersecting each other. If you still have problems Check the Basic Troubleshooting section at the end of this guide for a couple tips.*

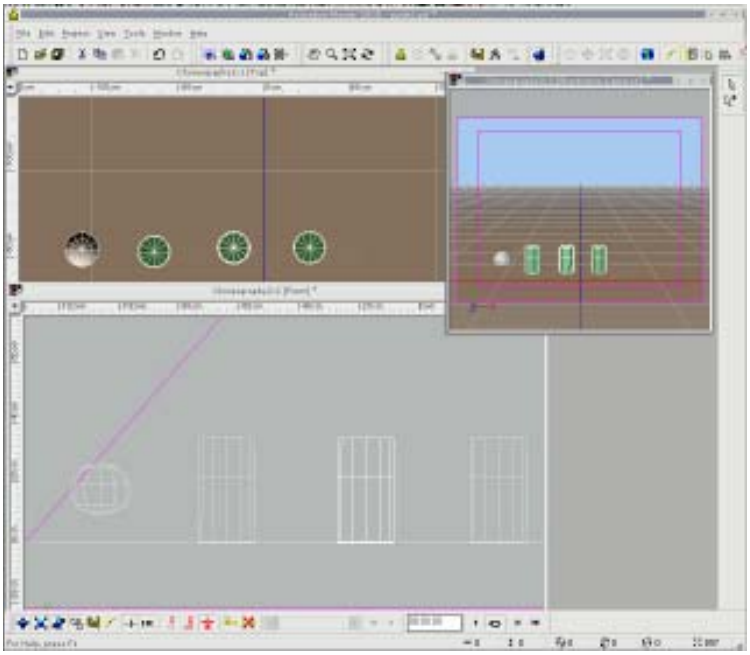

Fig 8 Setup the scene

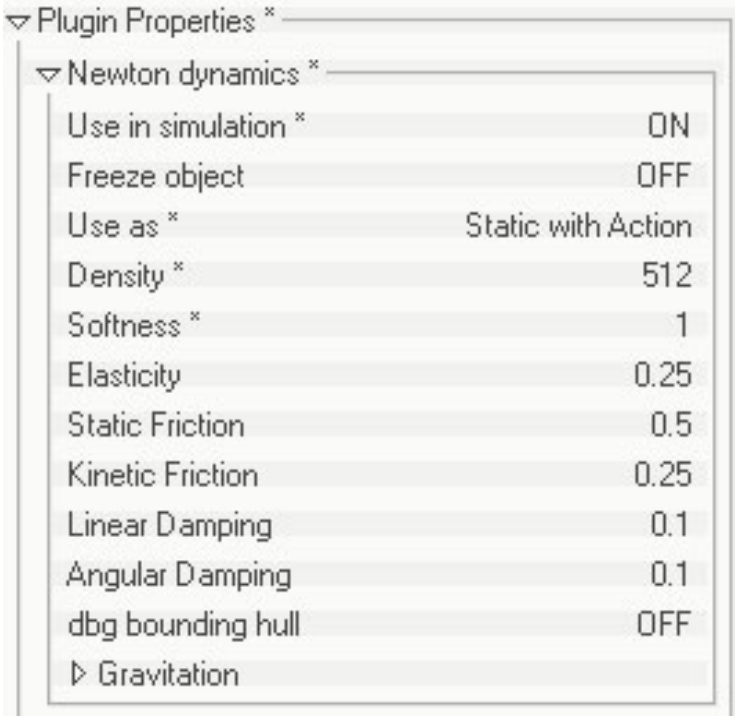

Fig 7, setup the sphere

Part III Basic Troubleshooting

So things didn't go as planned? Here are a few things to try and figure out what went wrong.

1 Check that your models aren't intersecting.

2 Check that you have all the objects turned ON in the Use in simulation property.

3 View the timeline and look at the keyframes (only useful if reduce keyframes is on when you run the sim) and you might be able to see where the simulation stopped running by the lack of keyframes from that point onward. Then you know its probably something that happens on that or the next frame that broke it.

4 try adding More Newton_# groups to your models if they arent colliding right. (this fixes more problems than you think it would)

5 Make sure you are NOT calculating over the previous attempt. Delete all the keyframes for all the dynamic objects except the first frame before running a simulation. That's why I encourage you to Save just Before running the sim. makes it easy to try again.

6 Try turning the use in simulation property off on all the shortcuts to your models in the chor. Then turn them on one at a time until you find out which model is breaking the simulation.

Part IV Inital Impulse on Dynamic Objects

Sorry but no pictures on this on. Its very straight forward and this should get you started.

1 Ok, still working with the assumption you've done the previous tutorials so we'll be using the cylinder object again. The inital impulse is the vector(s) of action that a dynamic option has at the start of the simulation.

2 **Create** a new **choreography** and drag a cylinder into it and make it hover just a little bit above the ground.

3 Next we **advance one frame** by entering 00:00:0**1** into the timeline.

4 From the front view **give** the **cylinder** a bit of a **nudge up and** to the **side**.

5 Now still at frame 0.5 **give** the **cylinder** a little bit of **rotation** (5 degrees has given me some nice backflips)

6 Now **Deselect** the **cylinder** to get out of rotate mode (am will crash if you're in rotate mode when you try to simulate)

7 **SAVE** your project. Just in case.

8 **Select** the **cylinder** again and right click on it and **set** the **simulation** to start at 00:00:00 and end at 00:01:15 or so.

9 **Click done** and watch the action unfurl. (Triple lindie anyone?)

Part V Complex Static Action Objects.

--Coming Soon--

Part VI Explosions?

--Coming Soon--