

DMM TUTORIAL 1: Creating simple DMM objects

In this tutorial you will use the two simplest techniques to create DMM objects:

- Creating a DMM primitive
- Creating a DMM object from a polymesh

Creating an orange with a DMM primitive

1. Create a new scene
2. Check that the Maya units are set to centimeters.

IMPORTANT NOTE ON MAYA UNITS:

The DMM plug-in treats 1 Maya linear unit equal to 1 meter. In the Maya preferences there is a setting for Linear Working Units. The default says "centimeter." This is a lie. **Do not change this setting.** Changing the setting will certainly do things that you don't want. Instead ignore it and believe that 1 Maya linear unit equals 1 meter because it really is. (For more information see the DMM User's Guide).

3. If you prefer, you can adjust the Grid settings to have 10 Grid lines per unit (every 10 centimeters in the DMM world).
4. Open the *DMM menu set* and the *DMM shelf*
5. Create a DMM sphere



- Select *DMM Asset / Create DMM Object Primitive / Sphere* or

There is your first DMM object! If you press the play button, you can see that it simulates (it falls under the effect of gravity)

6. Adjust the sphere's dimension to a radius of 0.1

- Open the DMM Asset Manager

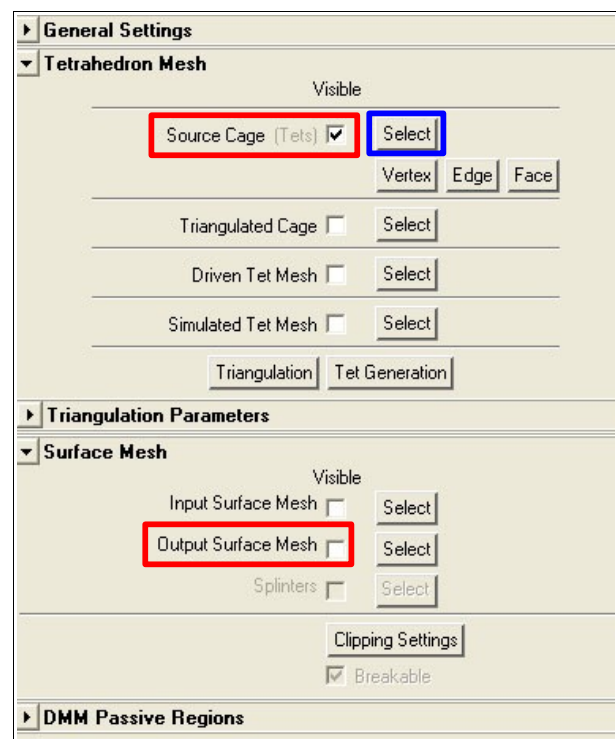
Select *Edit DMM / Asset Manager* or



- Check the *Visible* box for the *Source Cage* and uncheck it for the *Output Surface Mesh*

Note: All changes to the shape of a DMM Primitive Object should be done to its *Source Cage*, not to the *Final Output*.

- In the *Source Cage* section click the *Select* button
- Open the *Attribute editor* and change the *polySphere1 Radius* to 0.1



7. Adjust the number of subdivisions to get a smoother surface:
 - *Subdivisions Axis: 10 / Subdivisions Height: 10*
8. Just as any object in Maya, you can apply materials and textures to it. Try applying the *orange.jpg* texture and *orange_bump.jpg* bump map to your DMM sphere.

Note: This also has to be done on the Source Cage and not on the Final Output, but don't forget to use the *Refresh Surface Mesh* tool (*Edit DMM / Refresh Surface Mesh*), as the texture will not show in the final simulation otherwise.

9. Return to *Source Cage Hidden* and *Output Surface Mesh Visible* to see the final simulated result.

Creating a passive floor plane

As you can see, your orange just keeps falling. We are now going to build a floor plane which will stop it's fall.

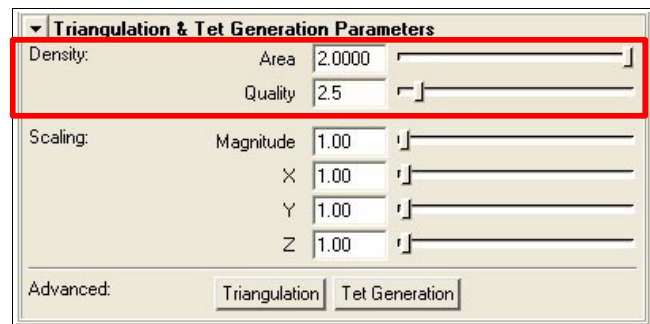
1. Create a polygon cube with the following dimensions: width:2 / height:0.1 / depth:2
2. Convert it to a DMM object with the Create DMM Object from Polymesh tool

- Select *DMM Asset / Create DMM Object from Polymesh* or



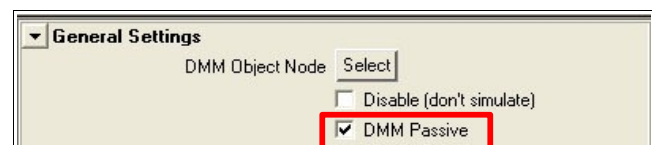
3. The resulting Tet Mesh is pretty detailed, which is unnecessary since we are not going to bend nor break the floor plane. To speed up the simulation, we can lower its number of triangles (thus Tets) without affecting the final simulation.

- In the *DMM Asset Manager / Triangulation Parameters* change the *Density* to *Area:2.0000 / Quality:2.5*



4. If you play the simulation now, you will see that both the orange and the floor plane fall under the effect of gravity, which is not what we were going for! To fix this we will turn the floor plane into a Passive DMM Object:

- In the *DMM Asset Manager / General Settings* check the *DMM Passive* box.



In this way, the floor plane will not simulate (it will not fall under the effect of gravity for instance) but it will affect other simulated objects.

Note: A *Passive DMM object* is not the same as a *Disabled DMM object*. A disabled DMM object is entirely removed from the DMM simulator. It will have no effect on other DMM objects.

5. Move the orange to a height of 2 meters

Important note: You have to do this at **Frame 1**, before the DMM simulation. Indeed, each DMM Object has a Maya transform node. It's initial position and orientation are set by this transform node, but after the initial time, the transform will have no effect on the position of the simulated part of the object.


6. Play the simulation for 30 frames.

Congratulations! You have just completed your first DMM simulation! Lets just create one more DMM object from a slightly more complicated polygon mesh.

Creating a bowl

1. Create a Polygon bowl with your preferred Maya tools. (No more than 300 polygons)
2. Check that your model is fit to be turned into a DMM object
 - Select *DMM Asset / Verify Polymesh*

Note: A polymesh needs to be watertight and not self intersecting to be used as a DMM object

3. Convert it to a DMM object with the Create DMM Object from Polymesh tool.
 - Select *DMM Asset / Create DMM Object from Polymesh* or 
4. Adjust it's density using the *DMM Asset Manager / Triangulation Parameters*
5. Place the bowl on the floor plane and let the orange fall into it.

You may have noticed that the orange is not smooth enough. But if we increase the number of polygons of the Source cage to lets say 15 subdivisions, the resulting Tet Cage will have more than 1000 tets! This would increase the rendering time drastically.

In order to get visually satisfying results while keeping rendering times to a minimum we can use another method to create objects. We will detail this method in tutorial 2.