

LightWave 5.6 Tutorials

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Note If you wish to print these pages out, keep in mind that they were designed to be printed back-to-back. That is, an odd page on one side and the subsequent even page on the other.

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Tutorial One: HyperVoxels

This tutorial will help you understand the basic fundamentals of HyperVoxels and present you with several tips and tricks.

First we need an object. For this tutorial will we use a simple object created to look similar to a jack. This object has good blending zones and can be easily animated. You will also notice it is made of only single-point polygons. Actually, we don't need to use polygons at all, but in this case, the object is more easily seen with them in Layout.



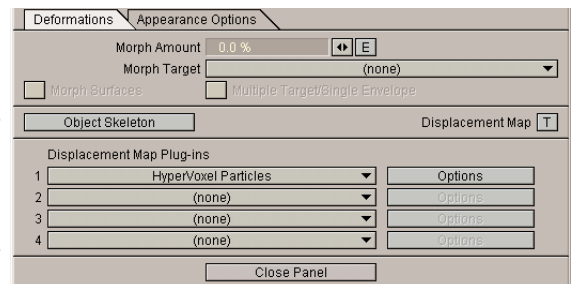
HINT: If you want to use only points without polygons, set the viewing option on the **Scene Editor** panel to **Points only** mode for that item. If you want to use an item that has polygons, but do not want them rendered, you can turn **Object dissolve** to 100%. HyperVoxels will still see the appropriate points and create the effect.)

1. Load the VOXJACK.LWO file from the OBJECTS\TUTORIAL directory.
2. Position the Camera so that the object fills the screen.
3. On the **Objects** panel, activate the Displacement plug-in called **LW_HyperVoxel_Particles**. This provides point information to the rendering engine.

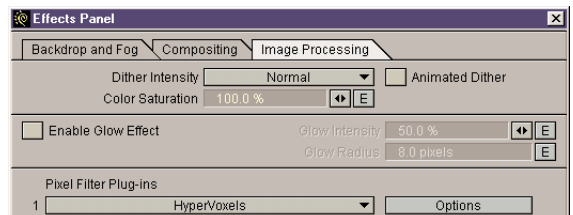


NOTE: You must move the current frame slider to the right and back to update displacement data. The easiest way is to click on the main Layout window, press the right arrow key and then the left arrow key.

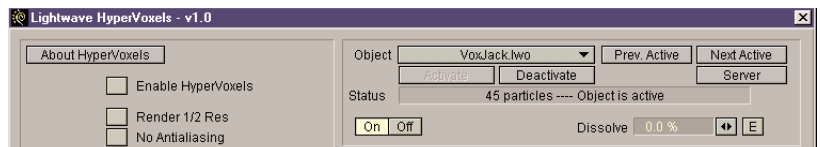
4. Open the **Effects** panel and create a gradient background color. (Suggested settings: **Zenith:** 0, 40, 80 **Sky:** 120, 180, 240 **Ground:** 120, 180, 240 **Nadir:** 0, 40, 80)



5. Now choose the **Image Processing** tab and select the pixel filter plug-in **LW_HyperVoxels** for the first slot. Click on the adjacent **Options** button to bring up the controls for **HyperVoxels**.



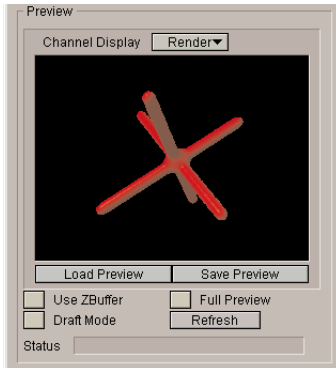
6. To activate the object, choose the VOXJACK.LWO from the **Object** pop-up list at the top of the screen. Once an object is selected, the **Activate** button becomes active. Click on **Activate** and a message should appear stating that object information was received.



If you do not receive this message, close the **HyperVoxels** panel and return to Layout. Move the current frame slider to the right and back to update the displacement plug-ins. Once this is accomplished, press the F5 key.

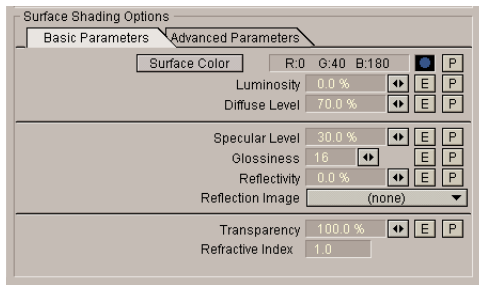


HINT: The F5 key automatically opens the most recent plug-in panel. If another panel (e.g., Objects) is open, click on the Layout window first.



7. Once you are back in the **HyperVoxels** interface you should be able to click the **Refresh** button and see the HyperVoxels version of your jack.

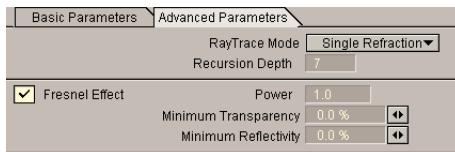
Pretty simple so far. The next step is to learn about surfacing the HyperVoxels object.



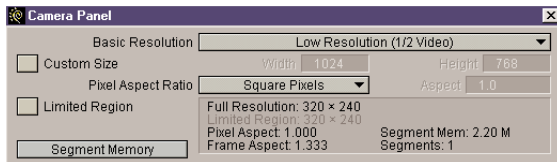
8. Start by creating a water texture for the VOXJACK. First reduce **Luminosity** to 0 and change the surface color to a nice shade of blue. Refresh the preview window.

9. Next the water needs to be transparent, so set the **Transparency** slider to 100%.

If you refresh the preview you will see nothing but some specularity. This is fine. Water by nature is often almost completely transparent. Its visibility will be created by what we call the Fresnel effect. The Fresnel effect changes reflectivity and transparency based on the angle of incidence. (The angle of incidence is the angle between an incident ray of light and the normal to a reflecting or refracting surface.)



10. Choose the **Advanced Parameters** tab and activate the **Fresnel Effect**.



11. Close the **HyperVoxels** panel and set **Basic Resolution** (Camera panel) to **Low Resolution (1/2 Video)**.

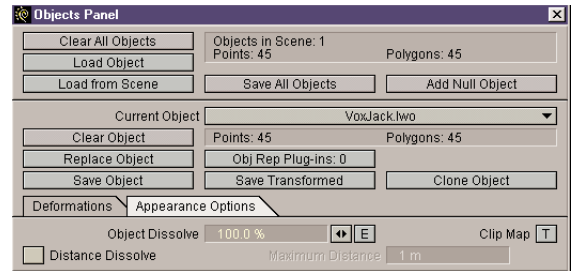
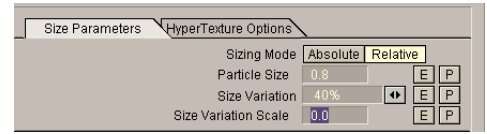


12. Make a quick render (F9). You should see the HyperVoxels effect appear over your gradient background. Once rendering is done, re-enter the **HyperVoxels** panel (F5). Now whenever you refresh the preview, the background will be visible.

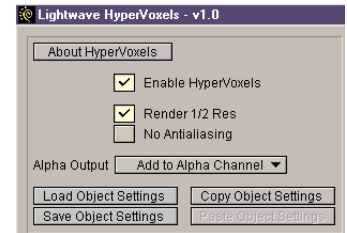


HINT: This function also supports previews of objects in a scene.

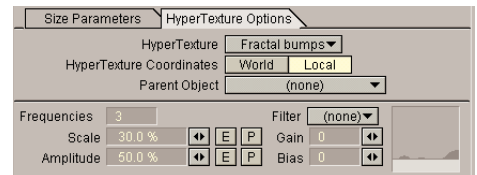
13. The Fresnel effect will sometimes create a relatively thick edge on the surface. To reduce this edge you can turn **Transparency** above 100%. In this case turn it up to 150% and make a refresh.
14. The next step to making our water look real is giving the surface some variation. To create swells on the object we will use the **Size Variation** option. Set the value to 40%. This increases the particle size randomly up to 40% and creates a good variance to add to the watery feel. Refresh the preview window.
15. Notice that the polygon particles are visible inside the HyperVoxels surface. To remove the little dots, simply change **Object Dissolve** on the **Objects Panel** to 100%. You can alternatively reduce **Polygon size** to 0 if you wish. Both are equally effective.



16. Once this is set, open the **Effects** panel and select the **LW_HyperVoxels_Doubler** for the second pixel filter plug-in slot.
17. Enter the **HyperVoxels** panel again and activate **Render 1/2 Res**. This improves render speeds when working in the Layout environment. It actually only renders every other pixel and then **LW_HyperVoxels_Doubler** interpolates in between. To see how this works, close the **HyperVoxels** panel and make a quick render (F9).

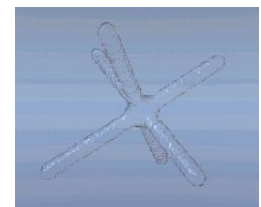


18. To add more variation to the surface, lets add some fractal bumps. Return to the **HyperVoxels** panel and select the **HyperTexture Options** tab. First, choose the **Fractal Bumps** filter and refresh the preview. You will immediately see the enhanced surface.



Notice there are many controls for the HyperTextures. On the far right hand side of the **HyperTextures** controls area is a small feedback window that will give you a preview to the contour of the texture. Change the **Scale**, **Amplitude**, **Bias**, and **Gain** values and you will see real-time feedback in that window. This is simply a cross section of your texture and can be used to quickly rough out the texture settings without lengthy test renders.

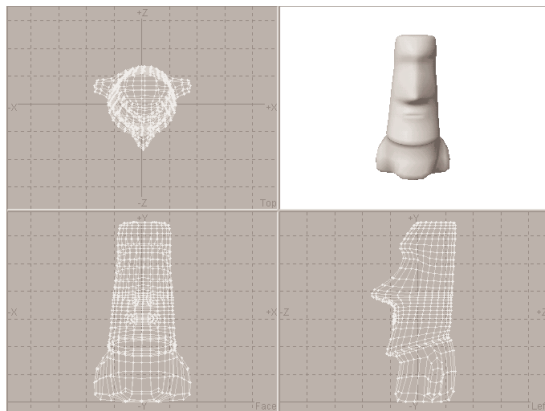
TIP: Many values can be set higher than the limits allowed by the mini-sliders. The mini-sliders provide a quick method for setting reasonable values. If you want to exceed these limits just type in the desired numeric value.



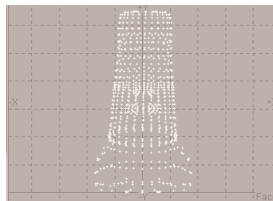
Try some of the other **Filters** to get a feel for what can be accomplished with the fractal HyperTextures.

Tutorial Two: The HyperVoxels Gradient Parameter

This tutorial explains the use and effect of HyperVoxels Gradient **P**arameters (The **P** button).



before kill polygons.

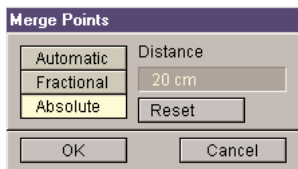


after kill polygons.

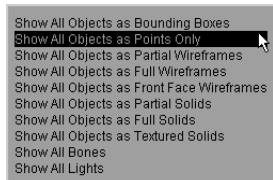
To illustrate the use of the gradient parameters option we are going to create a mossy EasterIsland head constructed completely of HyperVoxels.

1. Load the EASTERISLANDHEAD.LWO (OBJECTS\CHARACTERS subdirectory) into Modeler and kill all polygons by hitting the k key.

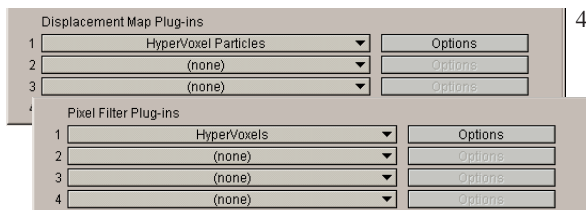
Since objects often have clusters of points very close together, and HyperVoxels reads point data, it is preferable to use objects with an even distribution of points. To modify existing objects with uneven point distribution, use the **Merge** points tool.



2. Set the **Merge** option (Tools Panel) to **Absolute** and set the Merge **Distance** to 20 cm. This will merge together all points that are within 20 cm of each other, resulting in a model with relatively balanced point distribution.



3. **Put** this points-only model into Layout as EASTERPOINTS.LWO. Set the viewing option to **Points Only (Scene Editor)** and change the EasterPoints.lwo object to blue. This improves the view of the object in Layout. On the **Effects** Panel, change the **Backdrop Color** to green. This will improve the view of object when you perform a quick render.



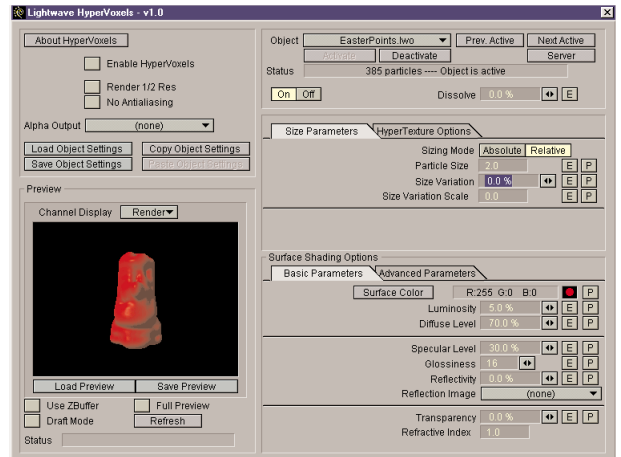
4. Apply the **LW_HyperVoxel_Particles** displacement plug-in (**Objects** Panel) to the object and move the frame slider to update the displacement data. Next, add the **LW_HyperVoxels** pixel filter plug-in (**Effects** panel).

5. In the **HyperVoxels** interface, choose the **EASTERPOINTS** object as the current item and activate it. **Refresh** the preview window. As you will see the particle size needs to be adjusted.

6. Set the **Particle Size** to 2. Your values may vary based on the point distances you use, but this should give a nice continuous surface.

Next, we need to surface the object. For surface color we are going to use a Gradient Parameter to create a mossy rock effect.

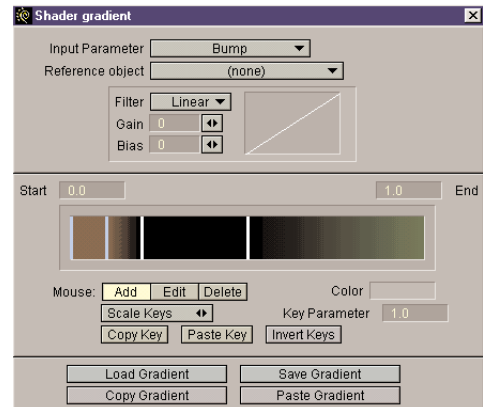
7. Select the **Surface Color** Parameter button.



8. On the **Shader gradient** panel, change the **Input** parameter to **Bump** so that we get a color change from valley to peak. Click the **Color** field (below the gradient bar) and create a brown base color (about R75 G35 B0).

9. We are going to set keys at values .1, .2, .5, and 1. First, activate the **Add Mouse** mode. Now, click the pointer in the gradient bar window to create the key, and then enter each new value into the **Key Parameter** field. The gradient will go from brown to black and then black to green.

After you've created the keys, move through them using the left and right **ARROWKEYS**. Select the key at .2 and click the **Color** field. Enter the values for black (R0 G0 B0). Do the same for the key at .5. Now, select the key at 1 and change the color to green (R0 G220 B0). Close the **Shader gradient** panel.

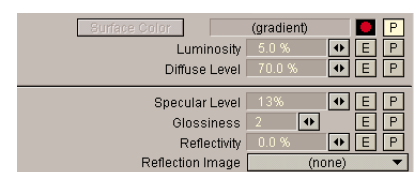
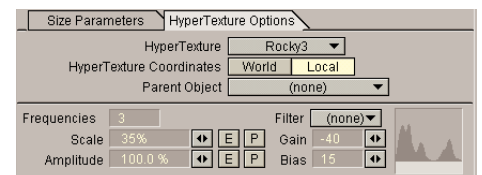


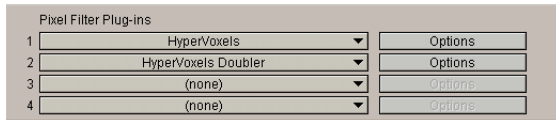
10. **Refresh** the preview. The surface will appear completely brown since the gradient relies on the HyperTexture bump level and there is none. To add it, add the **Rocky3** HyperTexture to the surface on the **HyperTextures Options** tab.

11. The settings need to be adjusted to fit this object. Suggested settings are: **Scale 35%** to give a good covering of relatively small bumps across the surface. Watch the real time cross section of the texture as you adjust the scale value. Setting **Amplitude** at 100% yields good tall bumps on the surface.

12. To further define the bumps, use the **Gain** and **Bias** controls. Again, moving these sliders provides real time feedback in the preview window so that you get a good idea of the bump contour. For this example, the settings were -40% for **Gain** and 15 for **Bias**.

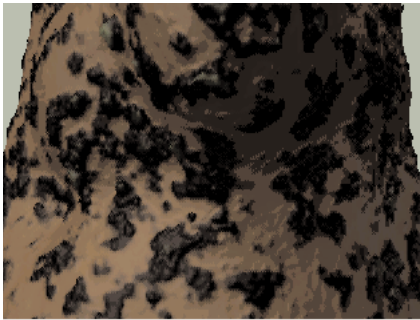
13. The specularity and glossiness attributes should also be modified. Since we're creating a rock reduce **Specularity** to 13% and **Glossiness** to 2. This provides a nice matte surface.





14. Add the **HyperVoxels_Doubler** plug-in (**Effects Panel**) and activate **Render 1/2 Res** on the **HyperVoxels** panel to improve render speeds. Return to Layout to create some renders.

Remember, HyperVoxels takes lights into account so you can improve the image by adding more dramatic lighting to the item. Also, try moving the camera very close to the object to get a better look at the virtual surfaces generated by the HyperTextures. You will notice a very high amount of detail and never a polygonal facet or edge.



Tutorial Three: Blowing bubbles

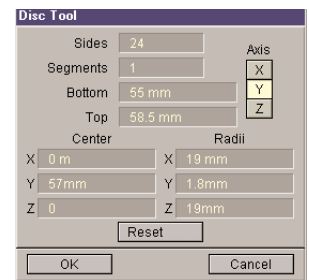
This tutorial shows how to create an animation of a bubble being blown from a child's bubble wand and floating out of the shot. Two new shader plug-ins, **FastFresnel** and **Interference** will be introduced.

The **Fresnel** shader simulates the “Fresnel effect”. When you stand directly in front of a window, you can see right through it. It has very little specular or reflective qualities. However, As you move to the side, the window becomes more like a mirror. This is the Fresnel effect. It appears on many surfaces such as water, glass and even bubbles. Another surface attribute of bubbles is the swirls of translucent color that appear on its surface. This is similar to the effect of combining oil and water. The colors are created from the light reflecting and refracting between the surface of the water and the surface of the oil. We will use the **Interference** shader to simulate this effect in the bubble.

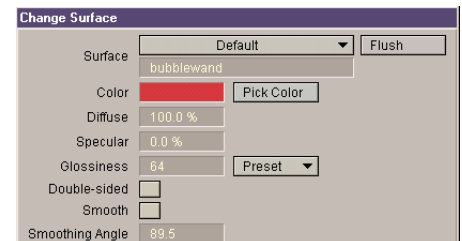
Let's start in the Modeler and create the objects.

Creating the Bubble Wand.

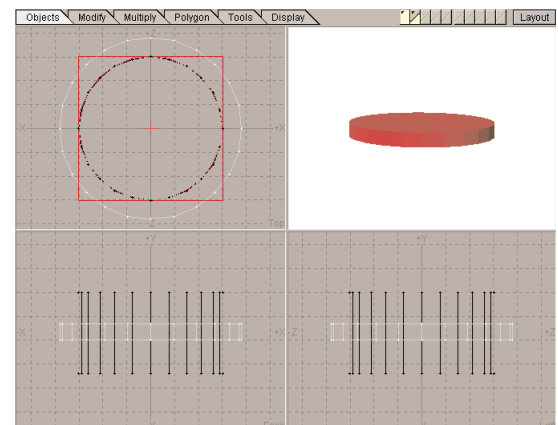
1. In Modeler, create a disc with the following dimensions:
Sides = 24; Segments = 1; Bottom = 55mm; Top = 58.5mm; Axis = Y
Center: X=0, Y=57mm, Z=0
Radii: X=19mm, Y=1.8mm, Z=19mm

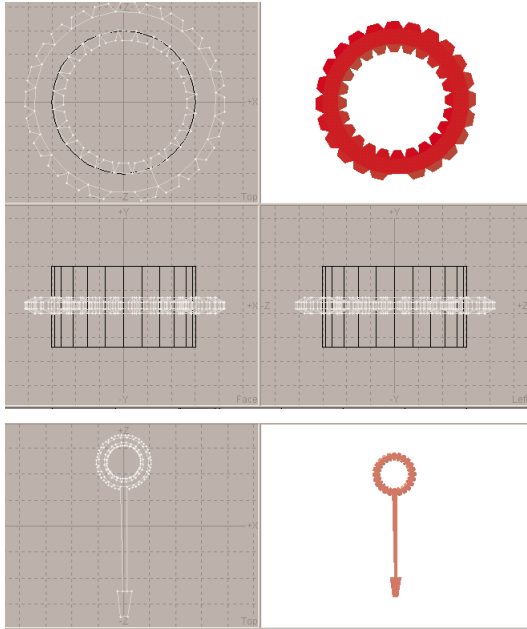
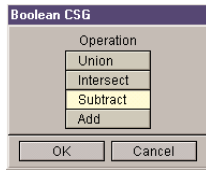


2. Hit Q and name the surface BUBBLEWAND. Make the surface color red.
3. Go to an empty layer and put the disc in the background layer.



4. Create a new disc with the dimensions: **Sides = 24; Segments = 1; Bottom = 48mm; Top = 65mm; Axis = Y; Center: X=0, Y=56.5mm, Z=0; Radii: X=15mm, Y=8.5mm, Z=15mm.**
5. Hit the apostrophe key to swap foreground and background layers.





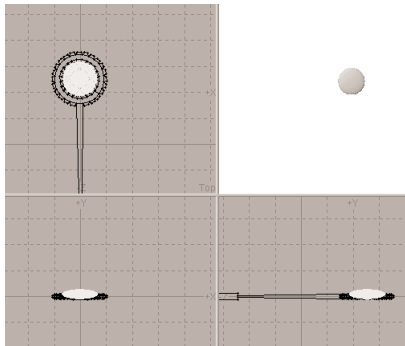
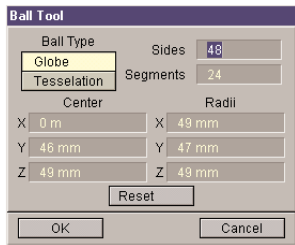
6. Press SHIFT+B and perform a **Boolean Subtract** to create a ring.
7. In the **Face** view, select the polygons that make up the inner and outer diameters of the ring. The number of polygons selected should be 48. (An easy way to do this is to use the **Polygon Statistics** panel. Just click the + **4 Vertices** button.)
8. Deselect one polygon at the bottom of the outer ring in the **Top** View.
9. Bevel the selected polygons with an **Inset** of 1mm and a **Shift** of 2mm.
10. Deselect all polygons and **Rotate** the object in the **Top** view so the unbeveled outer-ring polygon is facing straight down the -Z axis. This should be a rotation of +/- 7.5 degrees on the Y axis at 0, 0, 0.
11. Select the unbeveled polygon on the outer ring. Bevel this polygon 1mm on the **Inset** and 80mm on the **Shift**.
12. Bevel the selected Polygon again at -4mm on the **Inset** and 0 on the **Shift**.
13. Stretch this polygon in the face view so it is the same thickness as the shaft on the Y axis. Bevel again with 0 on the **Inset** and 20mm on the **Shift**.
14. Center the object using LW_Center and save it as BUBBLEWAND.LWO.

Making the Full Bubble

1. Create a sphere. **Ball Type** = globe; **Sides** = 48; **Segments** = 24; **Center:** X=0, Y=46mm, Z=49mm. **Radii:** X=49mm, Y=47mm, Z=49mm.
2. Hit SHIFT+T to triple the sphere. The ball should already be positioned so that it would rest on top of the ring of the wand.
3. Name the surface FULLBUBBLE and make it white. Save it as FULLBUBBLE.LWO.

Making the Flat Bubble

1. Copy the FullBubble to a new layer and put the Wand in the background. Activate the **Stretch** Tool.
2. Zoom in on the ring of the wand where the bubble is resting on the ring. Put the cursor in the **Face** view at the base of the bubble where it is resting on the ring.
3. Stretch the ball so it is flat. Using the other views, stretch the ball so it fits perfectly inside of the ring.
4. Save as FLATBUBBLE.LWO. This will be a morph target.



Creating the Animation

1. Load all three objects into the scene in Layout.
2. Select FULLBUBBLE and parent it to BUBBLEWAND.
(This allows you to move the wand so the bubble follows.)
3. Set the **Last Frame** to 190 in the lower right corner of the layout screen. On the **Render** panel set **Render First Frame** = 1; **Render Last Frame** = 190.
4. Go to the **Objects** Panel and select FLATBUBBLE as the current object.
5. On the **Appearance options** tab and set **Object Dissolve** to 100%. The FLATBUBBLE is only a morph target.
6. Select FULLBUBBLE as the current object. We will create the illusion of four breaths blowing the bubble.
7. Under the **Deformations** tab, select FLATBUBBLE as the **Morph Target**. Click on the "E" next to **Morph Amount** to create a morph envelope. There is currently a key at 0. Create a key at 15 by hitting the ENTER key, type in 15 and hit ENTER again. Create additional keys at the following frames: 27, 51, 66, 87, 102, 117 and 135.
8. Enter these values for the following keys:

0=100%	15=88.4%	27=69.6%
51=68%	66=44.4%	87=42.8%
102=19.2%	117=18%	135=0%

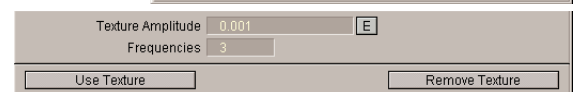
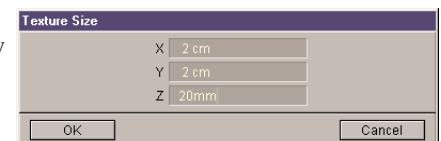
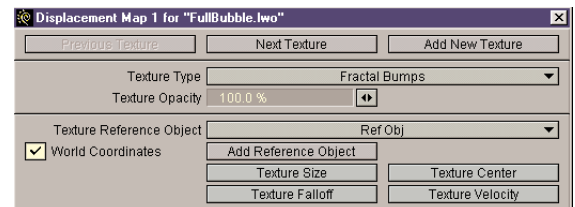
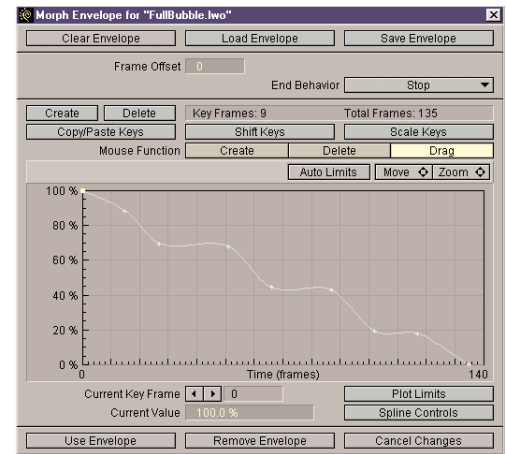
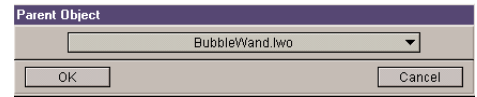
Click on **Use envelope**.

Now we will add some randomness to the shape of the bubble with two Displacement maps. We will try to simulate the wavering surface of a floating bubble.

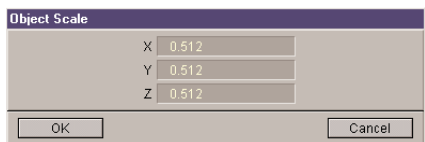
9. Click on the **T** next to **Displacement Map**. Choose **Fractal Bumps** as the **Texture Type** (this will create a random bumpiness).
10. Activate **World Coordinates**. This option allows the object to move through the texture, varying the placement of the texture as the bubble moves.
11. Set **Texture Size** to 20mm on all axes. This setting defines the size of the bumps. Set **Texture Velocity** to 1mm on all axes. This setting moves the object texture, by varying it while the bubble is still or moving.
12. Click on **Add Reference Object**.
13. Set **Texture amplitude** to .001 to define the height of the bumps. Set **Frequencies** to 3.

LightWave 3D allows for multiple layers of texture. Let's add a second layer of bumps, slightly different from the first.

14. Click on **Add New Texture** for another layer of texture. Choose **Fractal Bumps** again as the Texture Type.



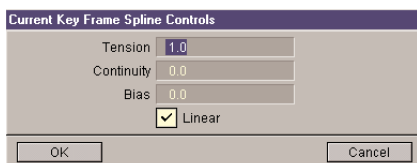
15. Turn on **World Coordinates**. Set **Texture Size** to 100mm on all axes. Set **Texture amplitude** to .003 and **Frequencies** to 3.
16. Click on **Use Texture** and then close the **Objects** panel.



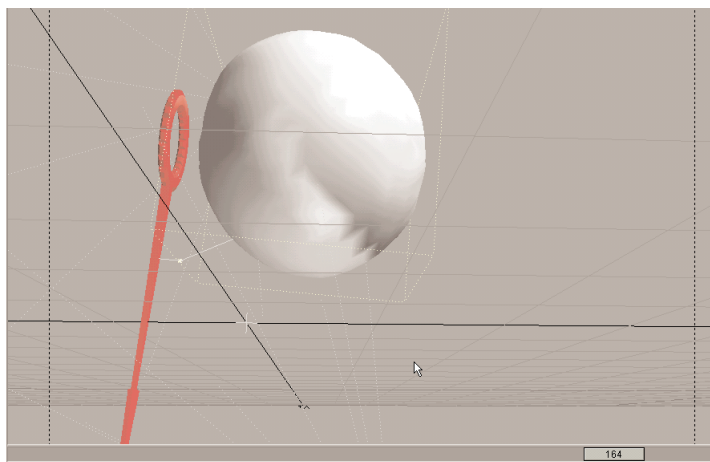
17. Select the **Ref Obj** as the current item. Click on **Size** and then **Numeric**. Enter .512 on all axes for object scale and click OK. Make a keyframe for it here at frame 0. This object adjusts the size of the current layer of the Fractal Bumps on the bubble. (This layer of bumps can be sized, rotated or moved interactively in real time by sizing, rotating or moving the Texture Reference Object.)

18. Select **Camera view** and keyframe the wand object at your desired position.
Let's create the motion for the bubble.

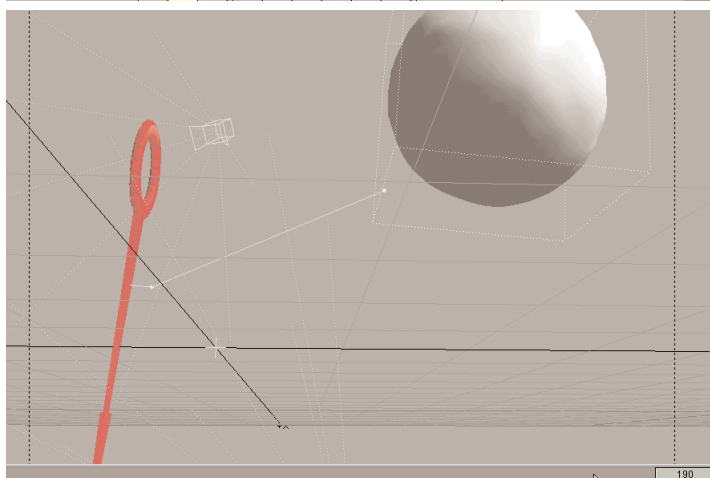
19. Select FULLBUBBLE as the **Selected Item**. It should be resting flat in the wand. Create a key at frame 0.



20. Create a key at frame 130 with a **Tension** of 1.0 and the **Linear** option selected.

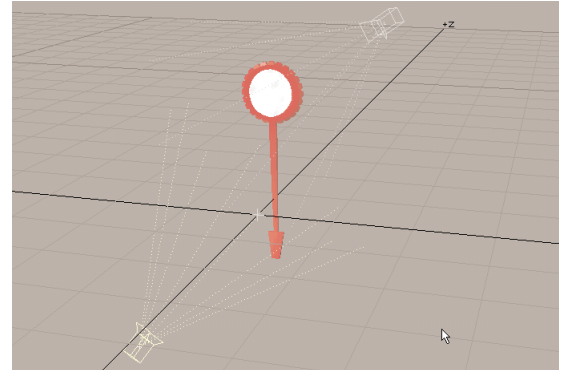


21. Create a key at frame 164 with the bubble detached from the wand.



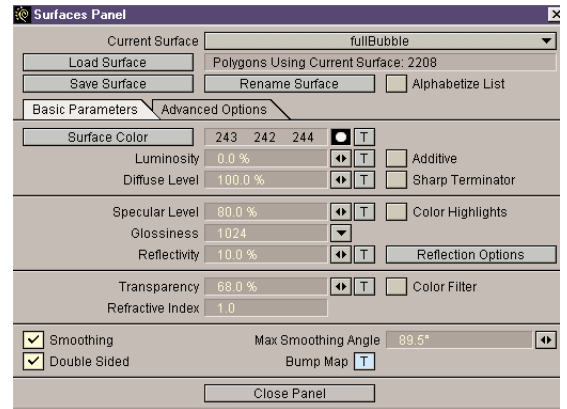
22. Create a key at frame 190 with the bubble floating further away.

20. You can also create a slight camera move throughout the animation. Focus the camera on the wand and let the bubble drift out of the shot.
21. Use two shadow mapped spotlights, placing one on each side of the wand. Set the first light to light from the top, the second to light from the bottom.

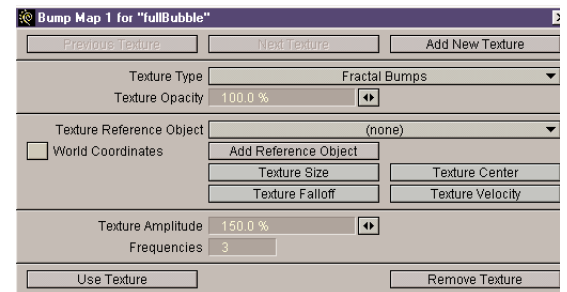


Now let's surface the bubble.

22. Go to the **Surfaces** Panel and select FULLBUBBLE as the **Current Surface**. Apply these settings: **Luminosity** = 0.0%; **Diffuse** = 100%; **Specular Level** = 80%; **Glossiness** = 1024; **Reflectivity** = 10%; **Transparency** = 68%; **Refractive** = 1.0; **Smoothing** = on; **Double Sided** = on.



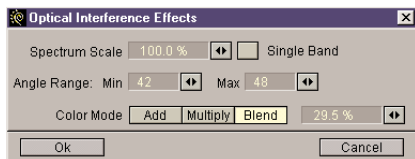
23. Click on the **T** for Bump Map. Set **Texture Type** = **Fractal Bumps**; **Texture size** = 20mm on all axes; **Texture Velocity** = 10mm on all axes; **Texture Amplitude** = 150%; **Frequencies** = 3. Click on **Use Texture**.



Now, let's add some Shaders.

24. Click on the **Advanced Options** Tab. Set the first Shader Plug-in slot to **LW_Fast Fresnel** and click on **Options**. Set the **Minimum Glancing Angle** to 74.
25. **Reflectivity** and **Specular** should both be active and set to 100%. **Transparency** should be active and set to 0%. This adds the Fresnel effect, adding realism to the reflective attributes of the bubble.



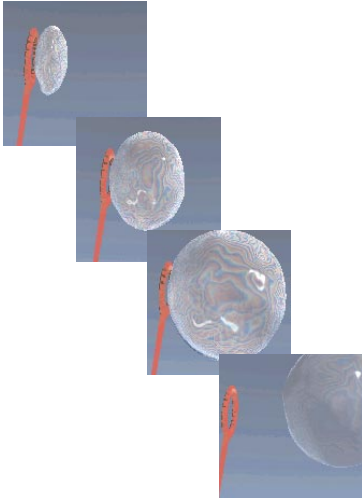


26. Set the second Shader Plug-in slot to **LW_Interference** and click **Options**. Set the **Spectrum Scale** to 100%. Set the **Angle Range** to **Min** = 42 and **Max** = 48. Set **Color mode** to **Blend**. For the **Blending** option, enter a value of 29.5%. Click **OK**.

This adds the color refraction and variances seen in soapy bubbles or oil on water. Close the panel.

27. Go to the **Effects Panel** and select **Gradient Backdrop**.

28. Render some test frames or the entire animation to see what you have. Try changing the fast Fresnel options or the reflective values of the bubble.



Tutorial Four: Jolt!

This tutorial will give you a basic introduction to the **LW_Jolt** Motion plug-in. **Jolt!** simulates the jarring movement created by the collision of two large objects. First, let's create the objects for the scene.

1. In **Modeler**, create a default ball and **Put** it into **Layout** as JOLT_BALL.LWO.
2. Create a box, using the defaults. In the **Face** view, move the ball -1m on the Y axis. **Put** the box in Layout as JOLT_BOX.LWO.

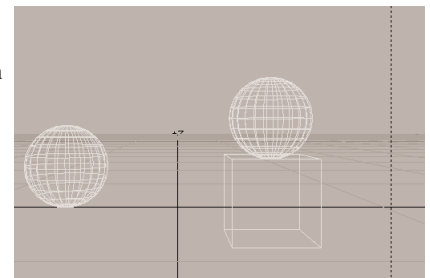
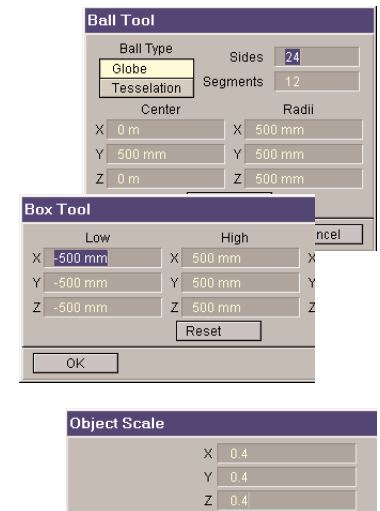
Next, basic object motion must be established.

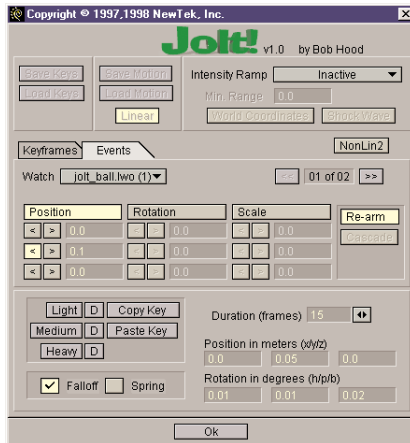
3. In Layout, open the **Options** panel and verify that **Auto Key Adjust** and **Auto Key Create** are inactive. This will keep us from creating unwanted keyframes.
4. Open the **Scene Editor** panel and change the object view to **Show Objects as Full Wireframes**. This will make our playback run faster.
5. In Layout, switch to **Camera** view.
6. Select Jolt_ball.lwo and size it to **X, Y and Z= .4**.
7. Move Jolt_ball.lwo to **X= -537.5mm; Y= 725 mm; Z= 0**. Make a keyframe at 0.
8. Go to the **Objects** panel and make one clone of the ball object. This saves us from having to resize the second ball.
9. Go to frame 15 and move Jolt_ball.lwo(1) up slightly on the **Y** axis to **Y= 745mm** and make a keyframe. Go to frame 30 and move the ball down to **Y= 0**. Make a keyframe.
10. Go to frame 0 and select Jolt_ball.lwo(2) Move it to **X= 452.5mm; Y= 857.5mm Z= 0**. Make a keyframe.
11. Go to frame 30, move the ball up slightly on the **Y** axis to **Y= 877.5mm** and make a keyframe. Go to frame 45 and move the ball down to **Y= 232.5mm**. Make a keyframe.
12. Return to frame 0, size the Jolt_box.lwo on all axes to **.4** and move it to **X= 445mm; Y= 445mm, Z= 0**. Make a keyframe.
13. Select the **Camera** and move it to **X= 0; Y= 400mm; Z= -2.5 m**, keyframe it at frame 0 and then play the Scene.

The two balls appear to levitate momentarily, then one falls to the ground and the other falls onto the box. However, the balls simply stop abruptly without causing any disturbance. This is awkward, dull, and unrealistic. Large objects colliding with one another should cause surrounding objects to shudder. This is a common effect in films where ships are under fire or prehistoric animals terrorize city streets.

Rather than worrying about shaking every object in the scene individually, we'll just use the camera to simulate the jarring effect.

14. Select the **Camera** and open its **Motion Graph**. From the **Motion Plug-ins** pop-up menu, choose **LW_JOLT**. Click on the **Options** button to open the **Jolt!** panel.





15. On the **Events** tab, select **Jolt-ball.lwo (1)** from the **Watch** pop-up menu.
16. Activate the **Position** and the Y axis < button (the second button beneath Position). Enter .1 into the input field.

The **Position** control determines the amount of deviation applied to the selected axis when object impact occurs. In this case, we are saying that when the object's Y position is less than .1 units (meters), create the effect.
17. Activate **Falloff** and set **Duration (frames)** to 15. Set the **Position in meters (x/y/z)** to 0, .05, and 0. Set the **Rotation in degrees (h/p/b)** to .01, .01, and .02.

These settings make the effect trail off over 15 frames. The position and rotation controls set the maximum deviation along the axes.
18. Beside the informational display field reading "**1 of 01**" click the >> button. This lets you create a Jolt! motion for a second object impact.
19. Select **Jolt_ball.lwo(2)** under the **Watch** pop-up menu. Activate **Position** and the Y axis < button. Enter .24 in the input field.
20. Activate **Falloff** and set **Duration (frames)** to 45. Set the **Position in meters (x/y/z)** to .01, .05, and .01. Set the **Rotation in degrees (h/p/b)** to .1, .2, and .8.
21. Click **OK** then click **Continue** to close the **Jolt!** panel. Click **Use Motion**.
22. Change **Last Frame** to 90 and play the Scene.

Now when the two spheres drop to earth, the impact sets the world to shaking.