18

Particle Systems and Space Warps-II

Learning Objectives

After completing this chapter, you will be able to:

- *Use Deflector space warps*
- *Use Geometric/Deformable space warps*
- *Use Modifier-based space warps*



INTRODUCTION

Space warps are non-renderable objects that affect the shape or appearance of the other objects. They generate force fields that are used to deform objects, create ripples, waves, wind, and so on. Space warps are similar to modifiers but unlike modifiers they influence world space instead of object space. In continuation to the last chapter, in this chapter also you will learn about different space warps. Besides this, you will learn about different parameters of the particle systems and their usage.

CATEGORIES OF SPACE WARPS

There are five categories of space warps: **Forces**, **Deflectors**, **Geometric/Deformable**, **Modifier-Based**, and **Particles & Dynamics**. You have learned about the **Forces** category in Chapter 17. The most commonly used categories of space warps are discussed next.

Deflectors

The tools in the **Deflectors** category are used to create the space warps that deflect the particles colliding with them. Some of the space warps in this category are discussed next.

Deflector Space Warp

Menu bar:	Create > SpaceWarps > Deflectors > Deflector
Command Panel:	Create > Space Warps > Deflectors > Object Type rollout > Deflector

The Deflector space warp is planar in shape and it is used to deflect the particles generated by the particle system, which collide with it, refer to Figure 18-1.

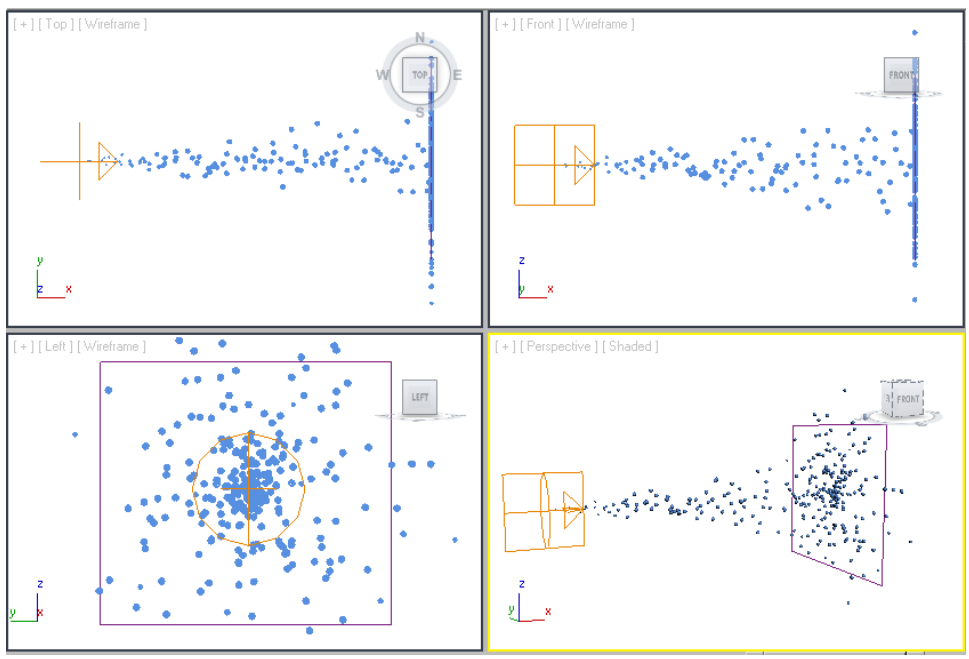


Figure 18-1 *The particles affected by the Deflector space warp*

To create a Deflector space warp, invoke the **Deflector** tool from **Create > Space Warps > Deflectors > Object Type** rollout in the **Command Panel**; the **Name and Color**, **Supports Objects of Type**, and **Parameters** rollouts will be displayed. Activate any of the viewports. Now, press and hold the left mouse button and drag the cursor to create the Deflector space warp; the Deflector space warp icon will be displayed in all viewports, as shown to Figure 18-1. Next, bind the Deflector space warp icon with the particle system using the **Bind to Space Warp** tool in the viewport. Also, set the parameters in the **Parameters** rollout to generate the desired effect. The **Parameters** rollout is discussed next.

Note

1. The size and position of the deflector icon affect the particles of a particle system.

*2. The **Supports Objects of Type** rollout as discussed in Chapter 17 is same for all space warps.*

Parameters Rollout

The options in this rollout are used to set the effect of the Deflector space warp on the particle system, refer to Figure 18-2. Make sure that the Deflector space warp is selected in the viewport. Choose the **Modify** tab in the **Command Panel**; the **Supports Objects of Type** and **Parameters** rollouts will be displayed.

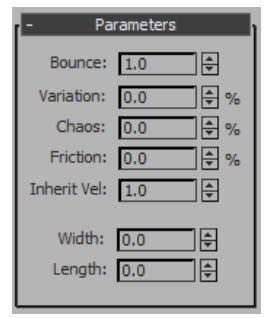


***Figure 18-2** The **Parameters** rollout for the Deflector space warp*

In the **Parameters** rollout, set the value in the **Bounce** spinner to control the speed at which the particles bounce off the deflector space warp. By default, the value in the **Bounce** spinner is 1.0 and the particles bounce off the deflector with the same speed at which they strike. As you decrease the value in this spinner, the speed of the particles at which they bounce off the deflector gets reduced. Set the value in the **Variation** spinner to vary the particle bounce specified in the **Bounce** spinner. Set the value in the **Chaos** spinner to create variation in the angle of reflection of the particles. Set the value in the **Friction** spinner to specify the amount in percentage by which the speed of the particles slows down when they move across the deflector surface. On setting a value more than 0 in the **Inherit Vel** spinner, the motion of the deflector affects the particles. Set the value in the **Width** and **Length** spinners to specify the width and length of the deflector icon in the viewport.

Tip: *To get an effect similar to the one created when particles reflect from an irregular surface, you need to set a higher value in the **Chaos** spinner.*

SDeflector Space Warp

Menu bar:	Create > SpaceWarps > Deflectors > SDeflector
Command Panel:	Create > Space Warps > Deflectors > Object Type rollout > SDeflector

The SDeflector space warp is similar to the Deflector space warp. The only difference is that the SDeflector space warp is spherical in shape, refer to Figure 18-3. It is used to deflect the particles that are generated by the particle system and collide with it.

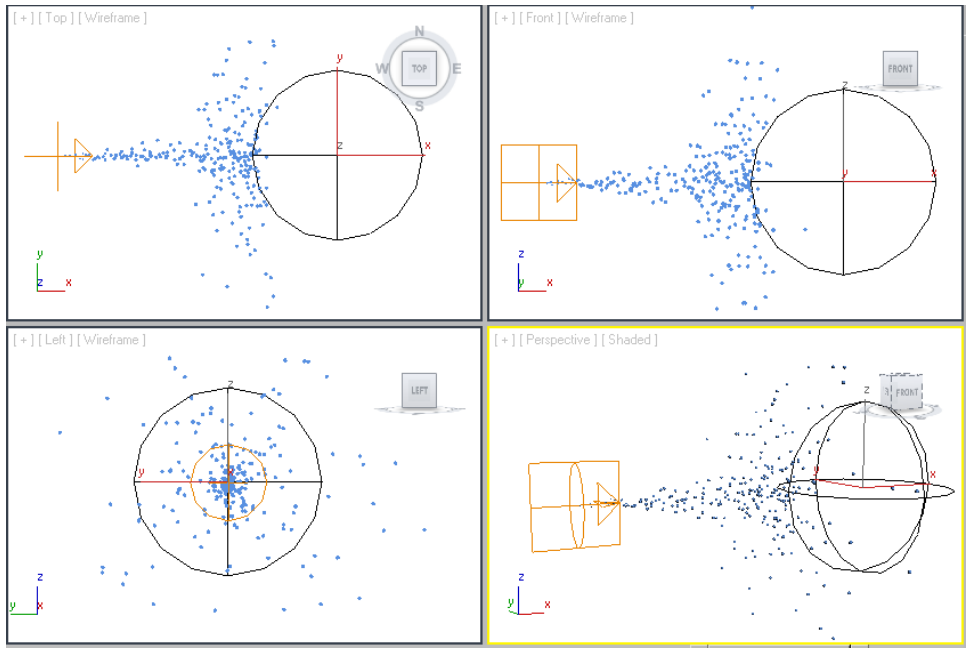


Figure 18-3 *The particles affected by the SDeflector space warp*

To create SDeflector space warp in a scene, you need to invoke the **SDeflector** tool from **Create > Space Warps > Deflectors > Object Type** rollout in the **Command Panel**; the **Name and Color**, **Supports Objects of Type**, and **Basic Parameters** rollouts will be displayed. The method of creating the SDeflector space warp and the options in the rollouts are the same as those discussed for the Deflector space warp.

UDeflector Space Warp

Menu bar:	Create > SpaceWarps > Deflectors > UDeflector
Command Panel:	Create > Space Warps > Deflectors > Object Type rollout > UDeflector

The UDeflector space warp is known as the universal deflector. You can use any object in the scene as a deflector using this type of space warp, refer to Figure 18-4.

To create the UDeflector space warp, invoke the **UDeflector** tool from **Create > Space Warps > Deflectors > Object Type** rollout in the **Command Panel**; the **Name and Color**, **Supports Objects of Type**, and **Basic Parameters** rollouts will be displayed. Activate any viewport. Now, press and hold the left mouse button and drag the cursor to create the UDeflector space warp; the UDeflector space warp icon will be displayed in all viewports, refer to Figure 18-4.

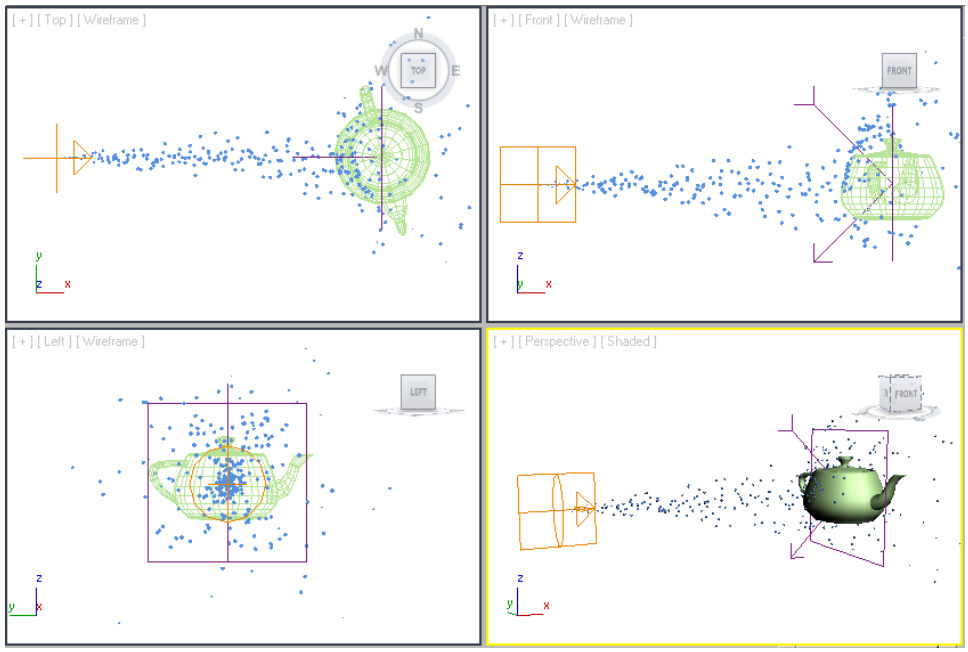


Figure 18-4 *The particles affected by the UDeflector space warp*

Next, bind the UDeflector space warp with the particle system in the viewport using the **Bind to Space Warp** tool. In the **Basic Parameters** rollout of the UDeflector space warp, choose the **Pick Object** button and select the object in the viewport that you want to create as a deflector object. Note that the object should be in front of the particle system. Also, set the parameters in the **Particle Bounce** area of the **Basic Parameters** rollout to generate the desired effect. The options in the **Particle Bounce** area of the **Basic Parameters** rollout are the same as discussed for the **Parameters** rollout of the Deflector space warp, refer to Figure 18-5.

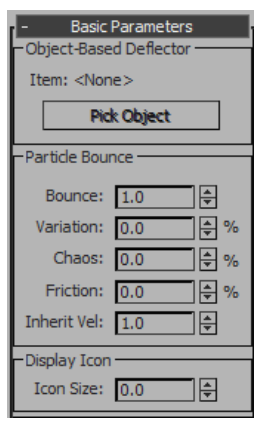


Figure 18-5 *The* ***Basic Parameters*** *rollout of the UDeflector space warp*

POmniFlect Space Warp

Menu bar:	Create > SpaceWarps > Deflectors > POmniFlect
Command Panel:	Create > Space Warps > Deflectors > Object Type rollout > POmniFlect

The POmniFlect space warp is very much similar to the Deflector space warp. However, it consists of additional options such as spawning, refraction, and so on.

To create the POmniFlect space warp, invoke the **POmniFlect** tool from **Create > Space Warps > Deflectors > Object Type** rollout in the **Command Panel**; the **Name and Color**, **Supports Objects of Type**, and **Parameters** rollouts will be displayed. Activate any of the viewports. Now, press and hold the left mouse button and drag the cursor to create the POmniFlect space warp; the POmniFlect space warp icon will be displayed in all viewports, as shown in Figure 18-6. Next, bind the POmniFlect space warp with the particle system using the **Bind to Space Warp** tool. Also, set the parameters in the **Parameters** rollout to generate the desired effect. The **Parameters** rollout is discussed next.

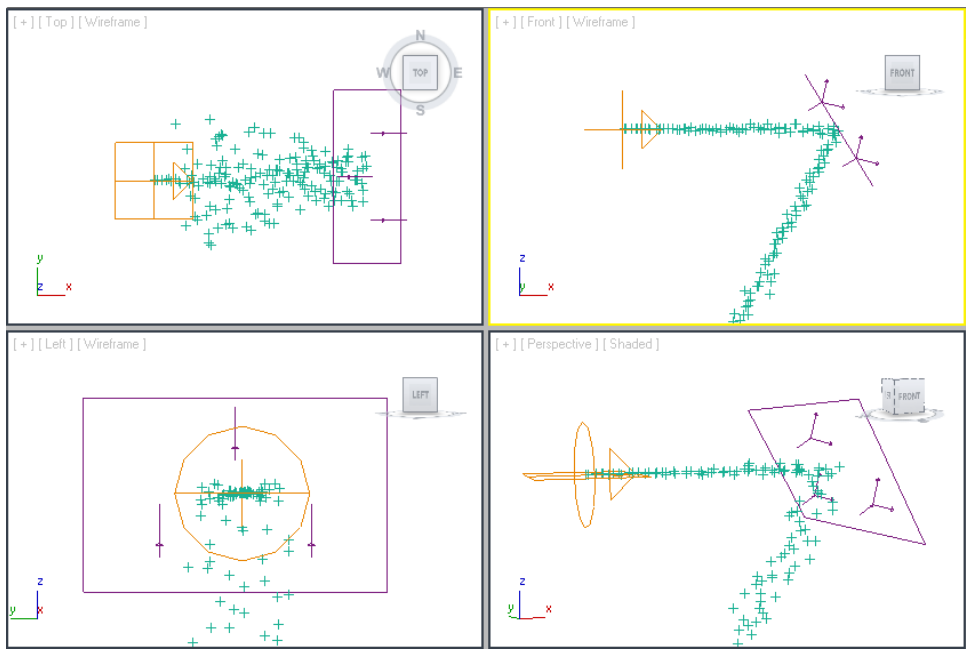


Figure 18-6 *The particles affected by the POmniFlect space warp*

Parameters Rollout

The options in this rollout are used to set the effect of the POmniFlect space warp on the particle system, refer to Figure 18-7. The areas in this rollout are discussed next.

Timing Area: The options in this area are used to specify the frame at which the deflector will start and end affecting the particles. Set the values in the **Time On** and **Time Off** spinners to specify the start and end frame number of the deflection effect, respectively.

Reflection Area

Set the value in the **Reflects** spinner to specify the number of particles affected by the space warp in terms of percentage, as shown in Figure 18-8. The other options in this area are the same as those discussed earlier in the Deflector space warp.

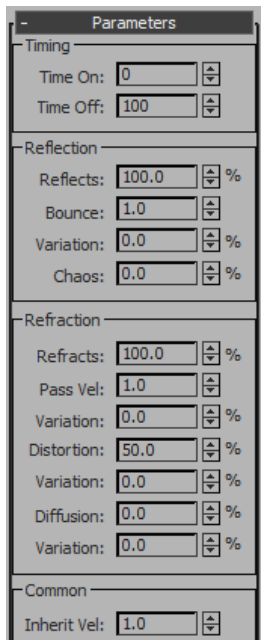


Figure 18-7 *Partial view of the* ***Parameters*** *rollout*

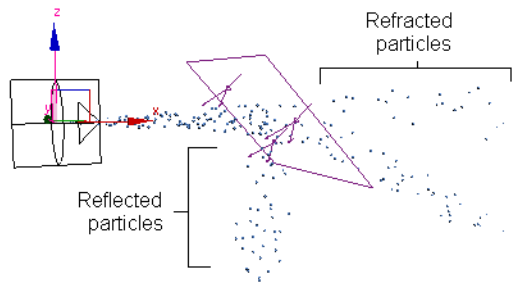


Figure 18-8 *The particles refracted and reflected by the space warp*

Refraction Area: The options in this area are used to specify the number of particles in percentage that will be refracted when they pass through the deflector, as shown in Figure 18-8. Set the value in the **Pass Vel** spinner to specify the speed of the particles refracted by the space warp. Set the value in the **Variation** spinner to vary the speed of particles in percentage. Set the value in the **Distortion** spinner to control the angle of refraction. Set the value in the **Diffusion** spinner to specify the angle at which all refracted particles will be scattered.

Common Area: The options in this area are the same as those discussed earlier in the **Parameters** rollout of the Deflector space warp.

Spawn Effects Only Area: The options in this area are used to affect the particles that are set to spawn on collision. Also, these options affect the particles that are neither reflected nor refracted by the space warp. Set the value in the **Spawns** spinner to specify the percentage of particles that will be affected by the spawn effects. The other options in this area are the same as those discussed earlier.

Display Icon Area: Set the value in the **Width** and **Height** spinners in this area to define the width and height of the POmniFlect icon in the viewport.



Note

The SOmniFlect and UOmniFlect space warps are similar to the POmniFlect space warp. The only difference is that the SOmniFlect space warp is spherical in shape and the UOmniFlect space warp can make any object in the viewport as a space warp object.

Geometric/Deformable Space Warps

The tools in the **Geometric/Deformable** category are used to create the space warps that deform the mesh objects. Some of the space warps in this category are discussed next.

FFD(Box) Space Warp

Menu bar:	Create > SpaceWarps > Geometric/Deformable > FFD(Box)
Command Panel:	Create > Space Warps > Geometric/Deformable > Object Type rollout > FFD(Box)

The FFD(Box) space warp is used to deform an object by adjusting the control points of a lattice box. It is similar to the FFD modifier that has been discussed in Chapter 12.

To create the FFD(Box) space warp, invoke the **FFD(Box)** tool from **Create > Space Warps > Geometric/Deformable > Object Type** rollout in the **Command Panel**; the **Name and Color**, **Supports Objects of Type**, and **FFD Parameters** rollouts will be displayed. Activate any of the viewports. Now, press and hold the left mouse button and drag the cursor in the same way as you do for creating a box from standard primitives; a box-shaped lattice with control points or FFD(Box) will be displayed, refer to Figure 18-9. Next, bind the FFD(Box) space warp with the object in the viewport that you want to modify using the **Bind to Space Warp** tool and set the position of the lattice box accordingly. Then, choose the **Modify** tab in the **Command Panel** and select the **Control Points** sub-object level in the modifier stack; the control points of the lattice will be displayed in the viewport. Now, adjust the position of the control points to modify the bound object, refer to Figure 18-10. Also, you need to modify the options in the **FFD Parameters** rollout. The options in the **FFD Parameters** rollout have already been discussed in Chapter 12.

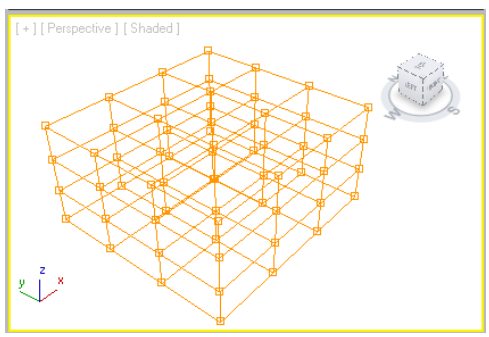


Figure 18-9 *The FFD(Box)*

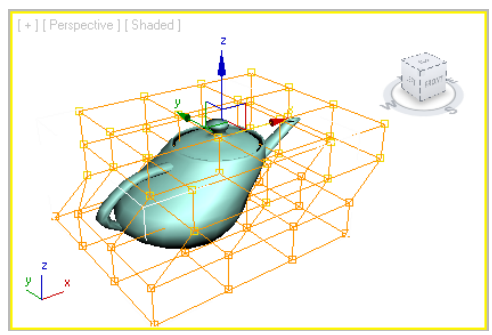


Figure 18-10 *The control points moved to modify the shape of the bound object*



Note

The FFD(Cyl) space warp is similar to the FFD(Box) space warp with the only difference that the FFD(Cyl) is cylindrical in shape.

Wave Space Warp

Menu bar:	Create > SpaceWarps > Geometric/Deformable > Wave
Command Panel:	Create > Space Warps > Geometric/Deformable > Object Type rollout > Wave

The Wave space warp is used to create a linear wave in space and affects the objects that are bound to it. It is also used to create the wavy effect in the objects.

To create a Wave space warp, invoke the **Wave** tool from **Create > Space Warps > Geometric/Deformable > Object Type** rollout in the **Command Panel**; the **Name and Color**, **Supports Objects of Type**, and **Parameters** rollouts will be displayed. Activate any of the viewports. Now, press and hold the left mouse button and drag the cursor to define the wavelength, and release the mouse button. Then, move the cursor up or down to define the amplitude of the waves; the Wave space warp icon will be displayed, as shown in Figure 18-11. Next, bind the Wave space warp icon with the object to which you want to apply the wave effect; the object will display the wave effect, as shown in Figure 18-12. Now, set the parameters in the **Parameters** rollout, which is discussed next.



Note

The number of segments on the object must be high to get the best effect of the Wave space warp.

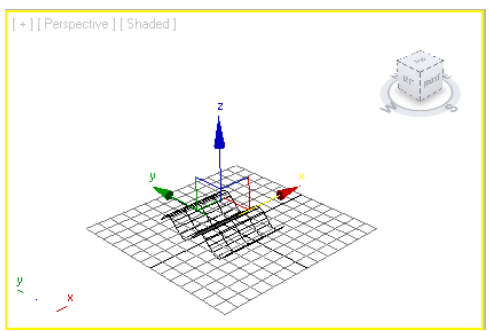


Figure 18-11 *The space warp icon for the Wave space warp*

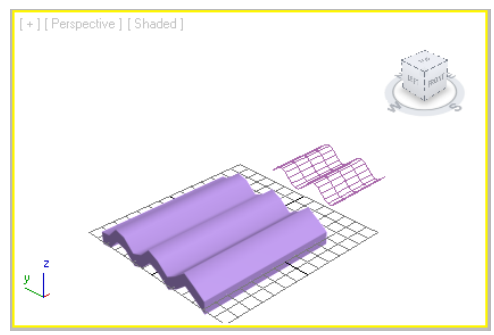


Figure 18-12 *The effect of the Wave space warp*

Parameters Rollout

The options in this rollout are used to modify the wave effects, refer to Figure 18-13. The areas in this rollout are discussed next.

Wave Area: Set the values in the **Amplitude 1** and **Amplitude 2** spinners to specify the wave amplitude along the X and Y axes of the Wave space warp object, respectively. Set the value in the **Wave Length** spinner to define the distance between the crests of the waves. Set the value in the **Phase** spinner to offset the phase of the wave from its origin. The value in the **Decay** spinner is used to decrease the amplitude of the waves as its distance increases from the center of the Wave space warp.

Display Area: Set the value in the **Sides** spinner to specify the number of segments across the width of the wave. Set the value in the **Segments** spinner to specify the number of segments across the length of the wave. Set the value in the **Divisions** spinner to specify the size of the wave icon without affecting the wave effect.

Note that the Wave space warp also has the **Flexibility** spinner that helps to individually adjust each bound object's stack, at the Wave Binding level. The spinner belongs to each binding object and doesn't appear with the Wave warp parameters. To do so, select the object that is bound to the Wave space warp and choose the **Modify** tab; the **Flexibility** spinner will be displayed in the **Parameters** rollout. Set the value in this spinner to specify how much the object will be affected by the Wave space warp.

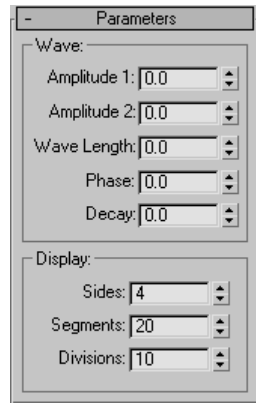


Figure 18-13 *The **Parameters** rollout*

Ripple Space Warp

Menu bar:	Create > SpaceWarps > Geometric/Deformable > Ripple
Command Panel:	Create > Space Warps > Geometric/Deformable > Object Type rollout > Ripple

The Ripple space warp is similar to the Wave space warp. The main difference is that the ripple space warp is used to create circular and concentric waves, as shown in Figure 18-14.

To create a Ripple space warp, invoke the **Ripple** tool from **Create > Space Warps > Geometric/Deformable > Object Type** rollout in the **Command Panel**; the **Name and Color**, **Supports Objects of Type**, and **Parameters** rollouts will be displayed. Activate any viewport, press and hold the left mouse button, drag the cursor to define the wavelength, and release the mouse button. Now, move the cursor up or down to define the amplitude of the waves; the Ripple space warp icon will be displayed. Next, bind the Ripple space warp icon with the object in which you want to apply the ripple effect; the object will display the ripple effect, refer to Figure 18-14.

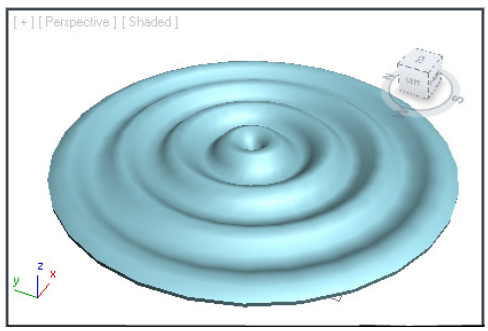


Figure 18-14 *The effect of the Ripple space warp*

Now, set the parameters in the **Parameters** rollout. These parameters are the same as discussed in the Wave space warp.

Note

*There are some other space warps in this category like Displace and Conform space warps. The effect of the Displace space warp is similar to that of the **Displace** modifier discussed in Chapter 12. The effect of the Conform space warp is similar to the **Conform** compound object.*

Bomb Space Warp

Menu bar:	Create > SpaceWarps > Geometric/Deformable > Bomb
Command Panel:	Create > Space Warps > Geometric/Deformable > Object Type rollout > Bomb

The Bomb space warp is used to explode the objects into their individual faces, as shown in Figure 18-15.

To create a Bomb space warp, first create an object that you want to explode. Next, invoke the **Bomb** tool from **Create > Space Warps > Geometric/Deformable > Object Type** rollout in the **Command Panel**; the **Name and Color**, **Supports Objects of Type**, and **Bomb Parameters** rollouts will be displayed. Next, click in the viewport to create the Bomb space warp; the Bomb space warp icon will be displayed, as shown in Figure 18-16. Now, bind the Bomb space warp with the object to be exploded, and then set the parameters in the **Bomb Parameters** rollout to generate a realistic effect. You need to drag the time slider to view the effect of the Bomb space warp. The **Bomb Parameters** rollout is discussed next.

Bomb Parameters Rollout

The options in this rollout are used to modify the bomb effect on the object, refer to Figure 18-17. The areas in this rollout are discussed next.

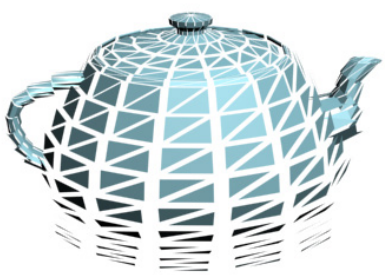


Figure 18-15 *The effect of the Bomb space warp at one frame*

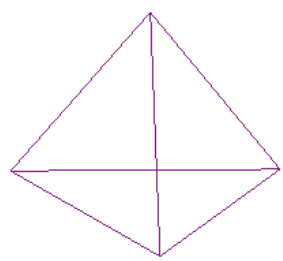


Figure 18-16 *The icon of the Bomb space warp*

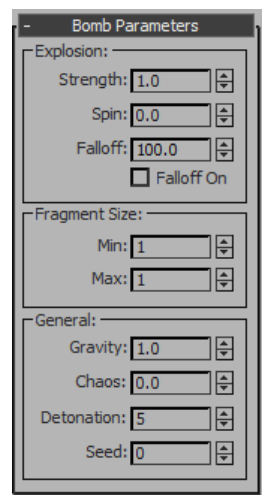


Figure 18-17 *The* ***Bomb Parameters*** *rollout*

Explosion Area: Set the value in the **Strength** spinner to specify the strength of the force to explode the object. Set the value in the **Spin** spinner to specify the rate of rotation of the fragments in revolutions per second. Select the **Falloff On** check box; the **Falloff** spinner will get activated. Also, a yellow falloff range will be displayed in the viewport. The value in the **Falloff** spinner is used to define the extents of the effect of the Bomb space warp. The fragments past this extent are not affected by the strength and spin settings, but are affected by the gravity setting.

Fragment Size Area: The options in this area are used to define the size of the fragments in the Bomb space warp. Set the value in the **Min** spinner to specify the minimum number of faces per fragment that will be generated by explosion. Set the value in the **Max** spinner to specify the maximum number of faces per segment that will be generated by explosion.

General Area: Set the value in the **Gravity** spinner to specify the acceleration in the fragments due to gravity along the world Z-axis. Set the value in the **Chaos** spinner to bring random variation in the explosion. The value in the **Detonation** spinner is used to define the frame at which the explosion effect will start. Set the value in the **Seed** spinner to specify the random numbers generated for explosion.

Modifier-Based Space Warps

The tools in the **Modifier-Based** category are used to create the space warps that generate the effects similar to the object modifiers. However, the modifier-based space warps do not have the sub-object levels. The **Modifier-Based** space warps are used when you want to assign the effects to a group of objects. Some of the space warps in this category are discussed next.

Skew Space Warp

Menu bar:	Create > SpaceWarps > Modifier-Based > Skew
Command Panel:	Create > Space Warps > Modifier-Based > Object Type rollout > Skew

The effect of the Skew space warp is similar to the **Skew** modifier. It is used to offset the geometry of an object uniformly in any of the three axes.

To create a Skew space warp, invoke the **Skew** tool from **Create > Space Warps > Modifier-Based > Object Type** rollout in the **Command Panel**; the **Name and Color**, **Gizmo Parameters**, and **Parameters** rollouts will be displayed. Activate any viewport and create the space warp in the viewport as you create a box primitive; a gizmo will be displayed, as shown in Figure 18-18. Next, bind the space warp gizmo with the object in the viewport that you want to skew, and then set the parameters in the **Parameters** rollout to get the desired skew effect, refer to Figure 18-19. The **Gizmo Parameters** and **Parameters** rollouts are discussed next.



Note

*The space warp icon for the **Modifier-Based** space warps such as **Twist**, **Bend**, and so on is the same.*

Gizmo Parameters Rollout

The options in this rollout are used to modify the dimensions of the space warp icon in the viewport, refer to Figure 18-20. Set the values in the **Length**, **Width**, and **Height** spinners in the **Gizmo Size** area to specify the length, width, and height of the space warp icon, respectively. Set the value in the **Decay** spinner in the **Deformation** area to decay the effect of the space warp on the bound object gradually.

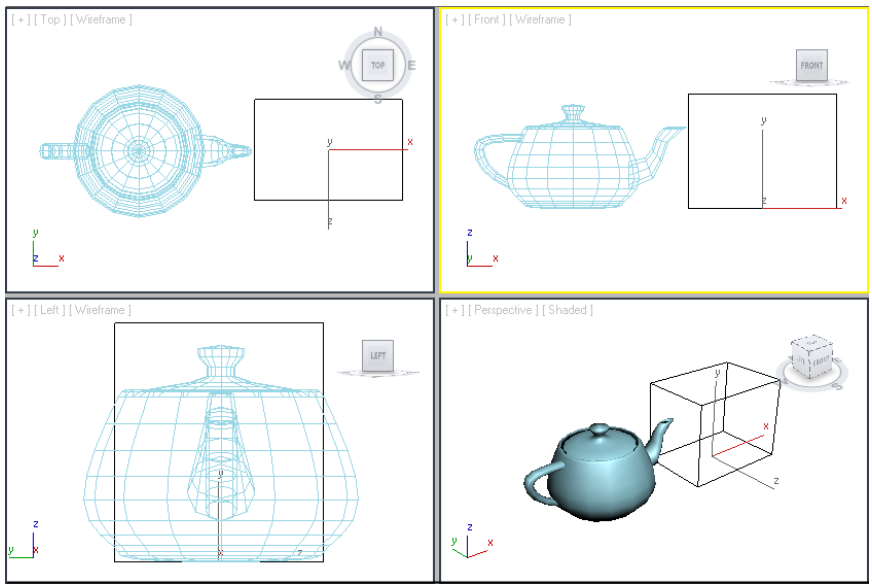


Figure 18-18 *The box shaped space warp gizmo displayed in all viewports*

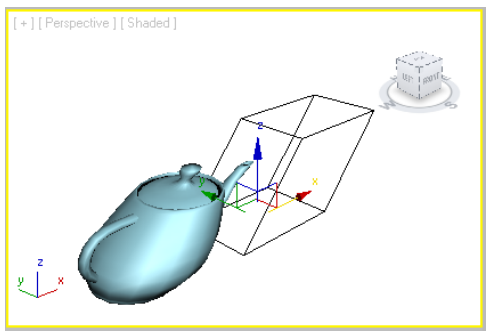


Figure 18-19 *The effect of the Skew space warp*

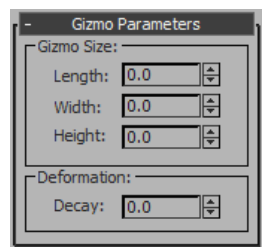


Figure 18-20 *The* ***Gizmo Parameters*** *rollout*

Note

The options in the ***Gizmo Parameters*** *rollout are same for all the modifier-based space warps.*

Parameters Rollout

The options in this rollout are used to modify the skew effect, refer to Figure 18-21. The areas in this rollout are discussed next.

Skew Area: The value in the **Amount** spinner is used to define an angle to skew the object from its vertical plane. Set the value in the **Direction** spinner to specify the direction of the skew. **Skew Axis Area** : Select the **X**, **Y**, or **Z** radio button to specify the axis to be skewed.

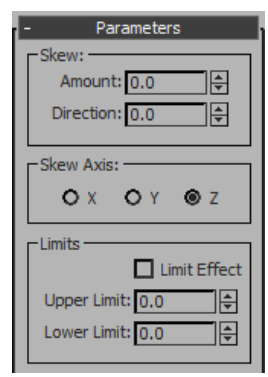


Figure 18-21 *The* ***Parameters*** *rollout*

Stretch Space Warp

Menu bar:	Create > SpaceWarps > Modifier-Based > Stretch
Command Panel:	Create > Space Warps > Modifier-Based > Object Type rollout > Stretch

The effect of the Stretch space warp is similar to the **Stretch** modifier. It is used to stretch the geometry of an object along the specified axis.

To create a Stretch space warp, invoke the **Stretch** tool from **Create > Space Warps > Modifier-Based > Object Type** rollout in the **Command Panel**; the **Name and Color**, **Gizmo Parameters**, and **Parameters** rollouts will be displayed. Activate the suitable viewport and create the space warp in the viewport as you create a box primitive; a box gizmo will be displayed. Next, bind the space warp gizmo with the object in the viewport that you want to stretch, and then set the parameters in the **Parameters** rollout to get the desired stretch effect, refer to Figure 18-22. The **Parameters** rollout is discussed next.

Parameters Rollout

The options in this rollout are used to modify the stretch effect, refer to Figure 18-23. The areas in this rollout are discussed next.

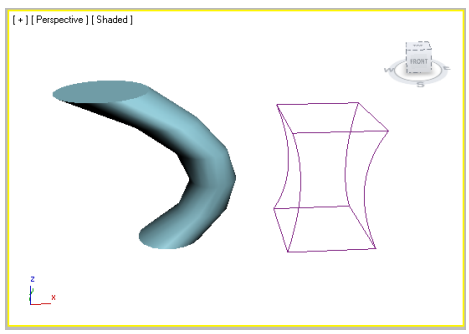


Figure 18-22 The effect of the Stretch space warp

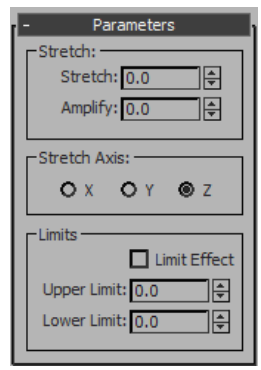


*Figure 18-23 The **Parameters** rollout*

Stretch Area: Set the value in the **Stretch** spinner to specify the amount of stretch on the object. Set the value in the **Amplify** spinners to adjust the stretch effect on the object.

Stretch Axis Area: Select the **X**, **Y**, or **Z** radio button to specify the axis in which the bound object will be stretched.

TUTORIALS

Tutorial 1

In this tutorial, you will create a scene with the animated fountains, as shown in Figure 18-24. **(Expected time: 60 min)**

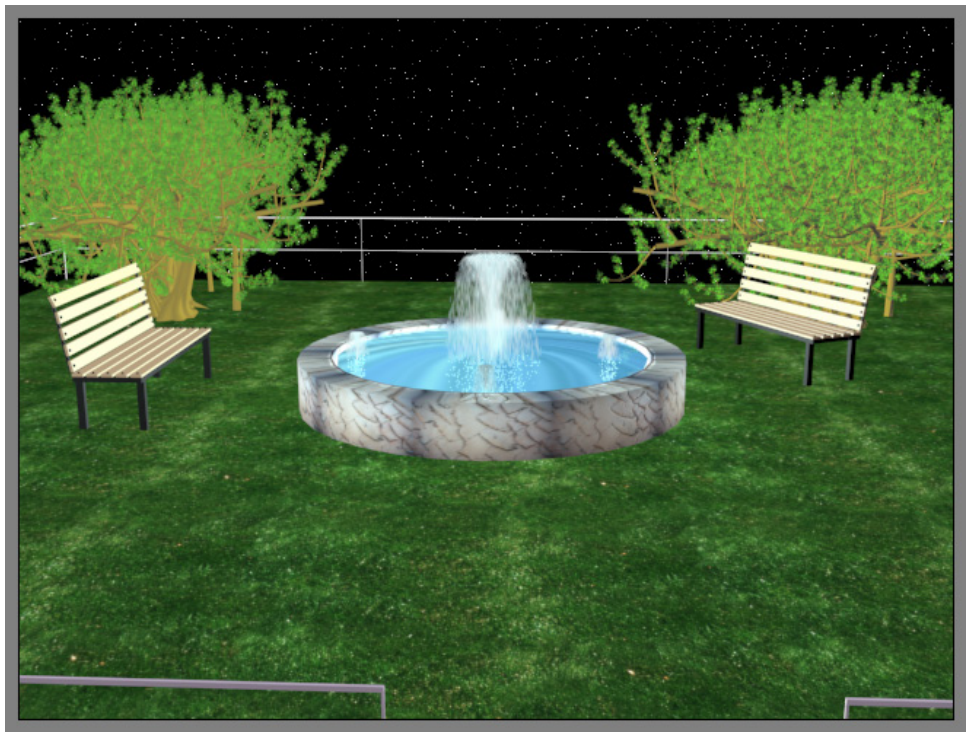


Figure 18-24 *The animated fountains in the scene*

The following steps are required to complete this tutorial:

a. Create the project folder.
b. Download the files.
c. Create the ground.
d. Create the camera.
e. Create the fountain wall.
f. Create the water surface.
g. Assign materials.
h. Create fountains.
i. Create plants, park benches, and railings.
j. Create lights.
k. Create the environment of the scene.
l. Save and render the scene.

Creating the Project Folder

Create a new project folder with the name *c18_tut1* at *\Documents\3dsmax2024* and then save the file with the name *c18tut1*, as discussed in Tutorial 1 of Chapter 2.

Downloading the Files

Before starting the tutorial, you need to download the *c18_3dsmax_2024_tut.zip* file from *www.cadcim.com*. The path of the file is as follows: *Textbooks > Animation and Visual Effects > 3ds Max > Autodesk 3ds Max 2024: A Comprehensive Guide*

Extract the contents of the zipped file and copy the files *grass.jpg*, *bricks.jpg*, and *water.jpg* at the location *\Documents\3dsmax2024\c18_tut1\sceneassets\images*.

Creating the Ground

In this section, you will create a plane for the ground by using the **Plane** tool.

1. Activate the Top viewport. Choose **Create > Geometry** in the **Command Panel**; the **Standard Primitives** option is displayed in the drop-down list below the **Geometry** button. Invoke the **Plane** tool from the **Object Type** rollout; various rollouts are displayed in the Modify panel.

2. Expand the **Keyboard Entry** rollout and set the parameters as follows:

   Length: **3000.0** Width: **3000.0**

3. Choose the **Create** button; a plane is created in all viewports. Invoke the **Zoom Extents All** tool; the plane is zoomed and displayed in viewports properly.

4. Modify the name of the plane to *ground*.

Creating the Camera

In this section, you will create a camera in the scene by using the **Free** camera tool to adjust the view of the scene.

1. Activate the Front viewport. Choose **Create > Cameras** in the **Command Panel**; the **Standard** option is displayed in the drop-down list. Invoke the **Free** tool from the **Object Type** rollout.

2. Click on the middle point of *ground* in the Front viewport; a free camera is displayed in the viewports and it is automatically named as *Camera001*.

3. Align the *Camera001* in viewports, as shown in Figure 18-25. Next, activate the Perspective viewport and press the C key to view the camera view.

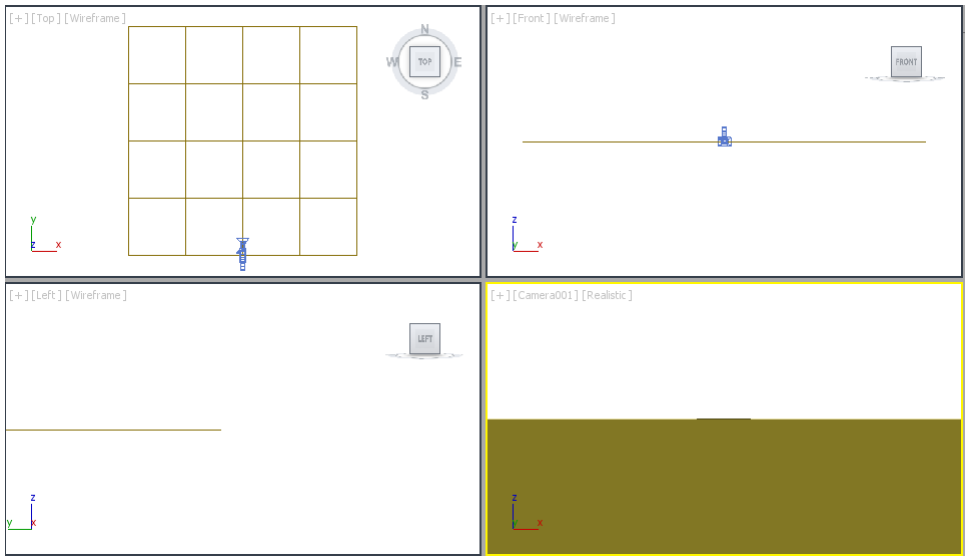


Figure 18-25 *The Camera001 aligned in viewports*

Creating the Fountain Wall

In this section, you will create the fountain wall by using the **Tube** tool.

1. Activate the Top viewport. Choose **Create > Geometry** in the **Command Panel**; the **Standard Primitives** option is displayed in the drop-down list. Invoke the **Tube** tool from the **Object Type** rollout; various rollouts are displayed in the Modify panel.

2. Expand the **Keyboard Entry** rollout and set the parameters as follows:

   Inner Radius: **379.328** Outer Radius: **313.33** Height: **100.424**

3. Choose the **Create** button; a tube is created in the viewports.

4. In the **Parameters** rollout, set the parameters as follows:

   Height Segments: **10** Sides: **32**

5. Modify the name of the tube to *fountain wall*.

6. Position the *Camera001* in the Left viewport using the **Select and Move** and **Select and Rotate** tools to view the scene in the Camera001 viewport, as shown in Figure 18-26.

Creating the Water Surface

In this section, you will create the water surface using the **Cylinder** tool.

1. Activate the Top viewport. Invoke the **Cylinder** tool from **Standard Primitives**; various rollouts are displayed in the Modify panel.

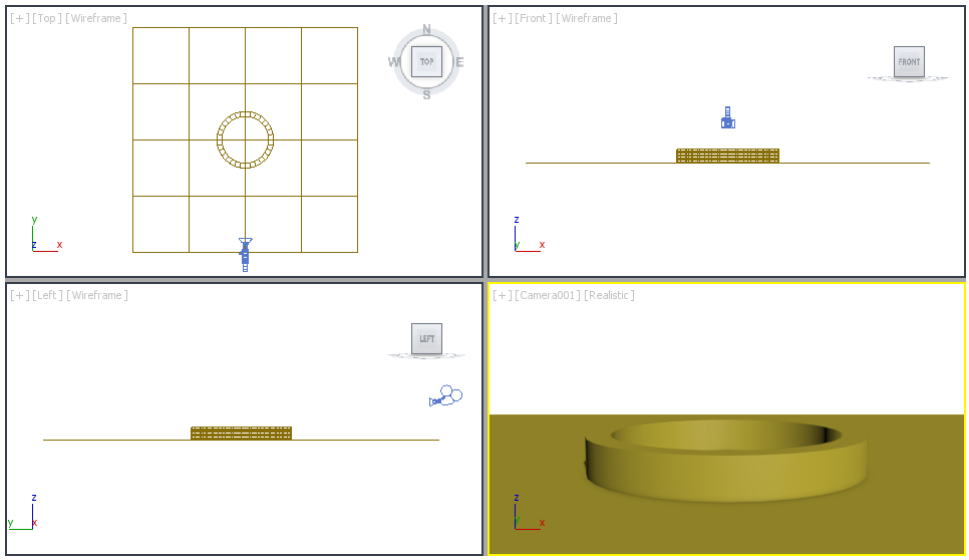


Figure 18-26 *The scene after aligning the Camera001 in viewports*

2. Expand the **Keyboard Entry** rollout and set the parameters as follows:

   Radius: **306.624** Height: **93.0**

3. Choose the **Create** button; a cylinder is created in viewports, as shown in Figure 18-27.

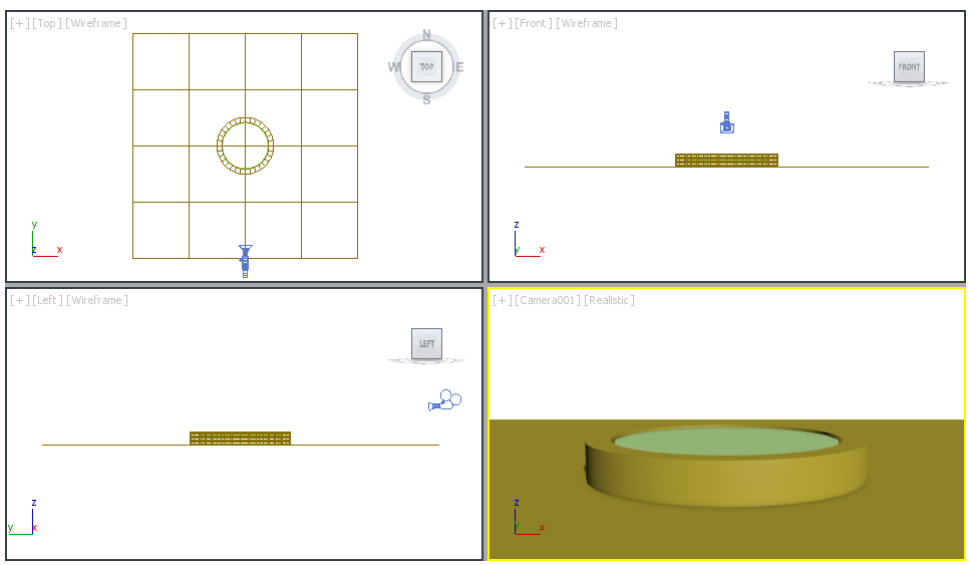


Figure 18-27 *The cylinder for creating the water surface*

4. Modify the name of the cylinder to *water01* and right-click in the viewport to exit the current command.

Assigning the Materials

In this section, you need to apply the materials to the objects to make them look realistic.

1. Select *ground* in the viewport and invoke the **Compact Material Editor** tool; the **Material Editor** dialog box is displayed.

2. Select the **01-Default** sample slot and modify its name in the **Material Name** text box to *ground material*.

   Next, you need to assign a map to the selected sample slot.

3. In the **Blinn Basic Parameters** rollout, choose the **Diffuse** map button on the right side of the **Diffuse** color swatch; the **Material/Map Browser** dialog box is displayed. Select the **Bitmap** map from the **Maps > Standard** rollout and choose the **OK** button; the **Select Bitmap Image File** dialog box is displayed. Select the **grass.jpg** image and choose the **Open** button; the selected image is displayed in the selected sample slot. Also, various rollouts are displayed to modify the coordinates of the map.

4. In the **Coordinates** rollout, set the value **5** in the **U Tiling** and **V Tiling** spinners. Choose the **Go to Parent** tool to go back to the parent level.

5. Make sure that *ground* is selected in the viewport and then choose the **Assign Material to Selection** button; the *ground material* is assigned to *ground* in the viewport. Also, choose the **Show Shaded Material in Viewport** tool to display the assigned material in the viewport.

   Next, you will assign a material to *fountain wall*.

6. Select the **02-Default** sample slot in the **Material Editor** dialog box. Modify its name in the **Material Name** text box to *fountain wall material*.

7. In the **Blinn Basic Parameters** rollout, choose the **Diffuse** map button on the right side of the **Diffuse** color swatch; the **Material/Map Browser** dialog box is displayed. Select the **Bitmap** map from the **Maps > Standard** rollout and choose the **OK** button; the **Select Bitmap Image File** dialog box is displayed. Select the **bricks.jpg** image and choose the **Open** button; the selected image is displayed in the sample slot. Also, various rollouts are displayed to modify the coordinates of the map.

8. In the **Coordinates** rollout, set the value **10** in the **U Tiling** and **V Tiling** spinners. Next, choose the **Go to Parent** tool to go back to the parent level.

9. Expand the **Maps** rollout and select the **Bump** check box to make it available for the material. Choose the **Bump** map button that is labeled as **None**; the **Material/Map Browser** dialog box is displayed. Select the **Bitmap** map from the **Maps > Standard** rollout and choose the **OK** button; the **Select Bitmap Image File** dialog box is displayed. Browse to the same image (*bricks.jpg)* that you have used for the **Diffuse** map and choose the **Open** button.

10. In the **Coordinates** rollout, set the value **10** in both the **U Tiling** and **V Tiling** spinners. Next, choose the **Go to Parent** tool to go back to the parent level; the name of the selected image is displayed over the **Bump** map button.

11. In the **Bump** spinner, set the value **100**.

12. Make sure that *fountain wall* is selected in the viewport. Choose the **Assign Material to Selection** button; the *fountain wall material* is assigned to the *fountain wall* in the viewport. Choose the **Show Shaded Material in Viewport** button to display the assigned material in the viewport.

    Next, you need to apply the **UVW Map** modifier to *fountain wall* to display the map properly.

13. Make sure the *fountain wall* is selected and then choose the **Modify** tab in the **Command Panel**. In the **Modifier List** drop-down list, select the **UVW Map** modifier; the **UVW Map** is displayed in the modifier stack. Also, the **Parameters** rollout is displayed to modify the parameters of the modifier.

14. In the **Parameters** rollout, select the **Spherical** radio button and then set the parameters as follows:

    Mapping area
    Length: **456.88** Width: **456.88** Height: **456.88**

    Next, you need to assign a material to *water01*.

15. Select the **03-Default** sample slot in the **Material Editor** dialog box. Modify its name in the **Material Name** text box to *water01 material*.

16. Choose the **Material Type** button that is currently labeled as **Standard**; the **Material/Map Browser** dialog box is displayed. Select the **Architectural** material from **Materials > Standard** and choose the **OK** button; the **Standard** material is replaced by the **Architectural** material now. Also, various rollouts are displayed to modify the **Architectural** material.

17. In the **Templates** rollout, select the **Water** option from the drop-down list.

18. In the **Physical Qualities** rollout, choose the **Diffuse Color** color swatch and enter the following parameters in the **Color Selector: Diffuse** dialog box:

    Red: **195** Green: **242** Blue: **246**

19. Choose the **Diffuse Map** button that is labeled as **None**; the **Material/Map Browser** dialog box is displayed. Select the **Bitmap** map from the **Maps > Standard** rollout and choose the **OK** button; the **Select Bitmap Image File** dialog box is displayed. Select the **water.jpg** image and choose the **Open** button; the selected image is displayed in the sample slot.

20. Choose the **Go to Parent** tool to go back to the previous level. In the **Physical Qualities** rollout, set the value in the **Shininess** spinner to **85.0**.

21. Select *water01* in the viewport and choose the **Assign Material to Selection** button in the **Material Editor** dialog box; the *water01 material* is assigned to *water01* in the viewport. Also, choose the **Show Shaded Material in Viewport** tool to display the assigned material in the viewport.

22. Activate the Camera001 viewport and invoke the **Render Production** tool to view the maps and materials assigned to the objects, as shown in Figure 18-28.

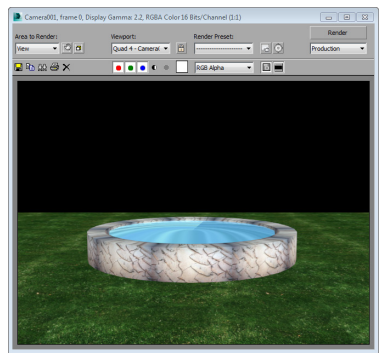


Figure 18-28 *The objects displayed at rendering after assigning the materials*

Creating Fountains

In this section, you will create fountains by using the **Super Spray** tool.

1. Activate the Top viewport and choose **Create > Geometry** from the **Command Panel**; the **Standard Primitives** option is displayed by default in the drop-down list. Select the **Particle Systems** option from the drop-down list and then invoke the **Super Spray** tool from the **Object Type** rollout.

2. In the Top viewport, press and hold the left mouse button, drag the cursor from one point to another, and release the left mouse button; the emitter is created for the super spray particle system. Align the emitter at the middle of the *water01* in all viewports, as shown in Figure 18-29.

3. Modify the name of the particle system to *fountain01*. Also, modify the color by entering the parameters as follows:

   Red: **154** Green: **215** Blue: **229**

   Next, you need to set the parameters in different rollouts.

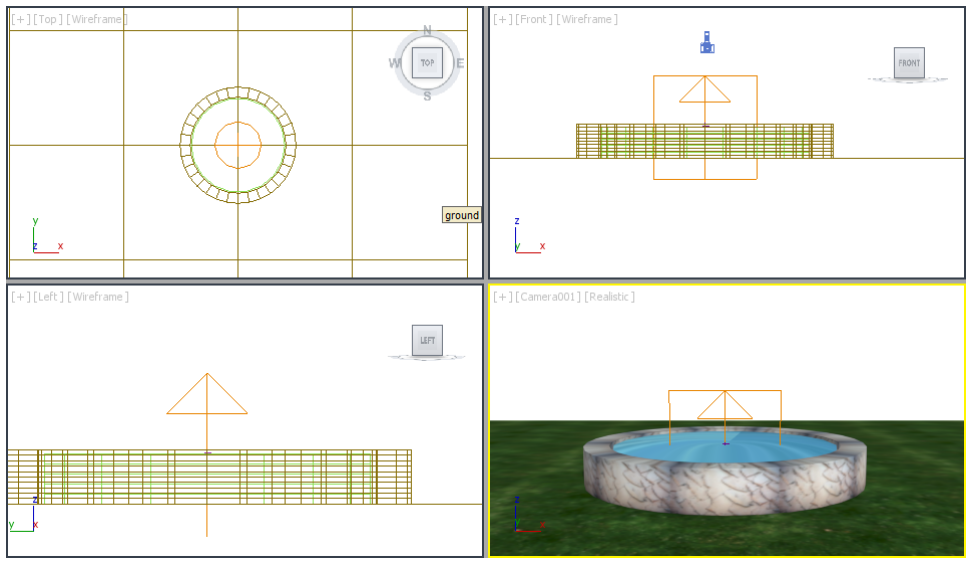


Figure 18-29 *The emitter aligned in viewports*

4. Choose the **Modify** tab in the **Command Panel**; various rollouts are displayed. In the **Basic Parameters** rollout, set the parameters as follows:

Particle Formation area
Off Axis: **0.0** Spread: **7.0**
Off Plane: **0.0** Spread: **90.0**

Display Icon area
Icon Size: **50.0**



Note

The icon size of the particle system does not affect the particles. However, the small size provides more room to work in the viewport.

5. In the **Particle Generation** rollout, make sure that the **Use Rate** radio button is selected from the **Particle Quantity** area and then set the value **80** in the spinner below this radio button. Next, set the parameters as follows:

Particle Motion area
Speed: **12.0**

Particle Timing area
Emit Start: **10** Emit Stop: **100**
Display Until: **100** Life: **75**

Particle Size area
Size: **5.0**

6. In the **Particle Type** rollout, make sure that the **Standard Particles** radio button is selected in the **Particle Type** area. Next, in the **Standard Particles** area, select the **Tetra** radio button.

7. Activate the Camera001 viewport and choose the **Play Animation** button; the particles start moving towards the vertical axis.

   Next, you need to increase the number of frames for the animation.

8. Choose the **Time Configuration** button at the bottom of the 3ds Max interface; the **Time Configuration** dialog box is displayed.

9. In the **Animation** area, choose the **Re-scale Time** button; the **Re-scale Time** dialog box is displayed. In the **New** area, set the value **500** in the **Length** spinner and choose the **OK** button. Next, choose the **OK** button in the **Time Configuration** dialog box to close it.

10. Activate the Camera001 viewport and choose the **Play Animation** button; the particles start moving toward the vertical axis, as shown in Figure 18-30. Also, align the Camera001 in the viewports, as shown in Figure 18-30.

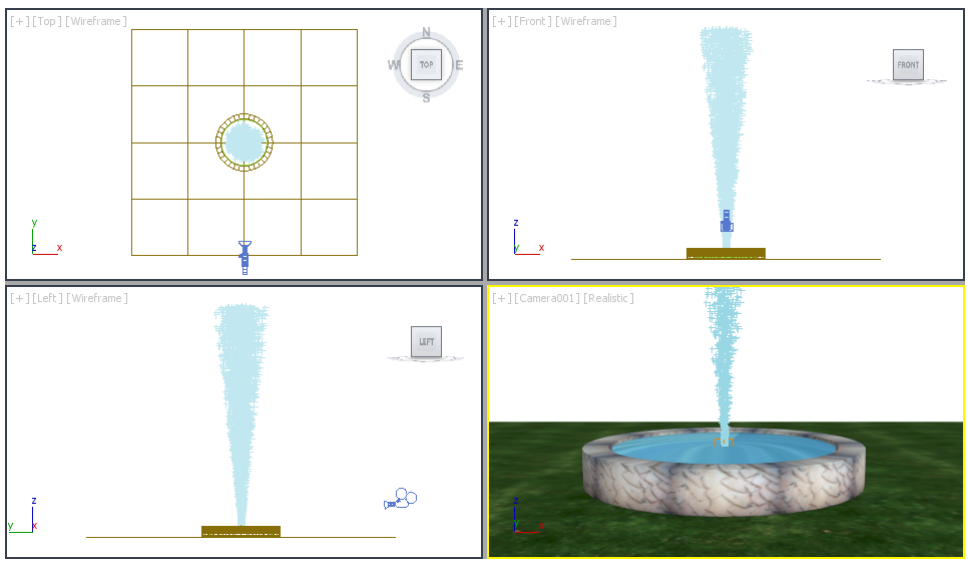


Figure 18-30 *The particle simulation displayed in all viewports after playing the animation*

Note

*When you change the values in the **Re-scale Time** dialog box, the values in the **Particle Timing** area of the **Particle Generation** rollout also get changed.*

Notice that the particles are moving in the upward direction. To bring them downward, you need to apply the Gravity space warp to the particle system.

11. Activate the Top viewport. Choose **Create > Space Warps** in the **Command Panel**; the **Forces** option is displayed in the drop-down list. Invoke the **Gravity** tool from the **Object Type** rollout.

12. Press and hold the left mouse button and drag the cursor in the Top viewport. Next, release the left mouse button; the Gravity space warp icon is displayed in all viewports.

13. Next, choose the **Modify** tab in the **Command Panel**. Next, in the **Parameters** rollout, set the value **4.5** in the **Strength** spinner of the **Force** area.

14. Select *fountain01* in any viewport and invoke the **Bind to Space Warp** tool from the **Main Toolbar**. Now, bind *fountain01* with the Gravity space warp icon; the direction of particles is changed, as shown in Figure 18-31. Invoke the **Select Object** tool to exit the **Bind to Space Warp** command.

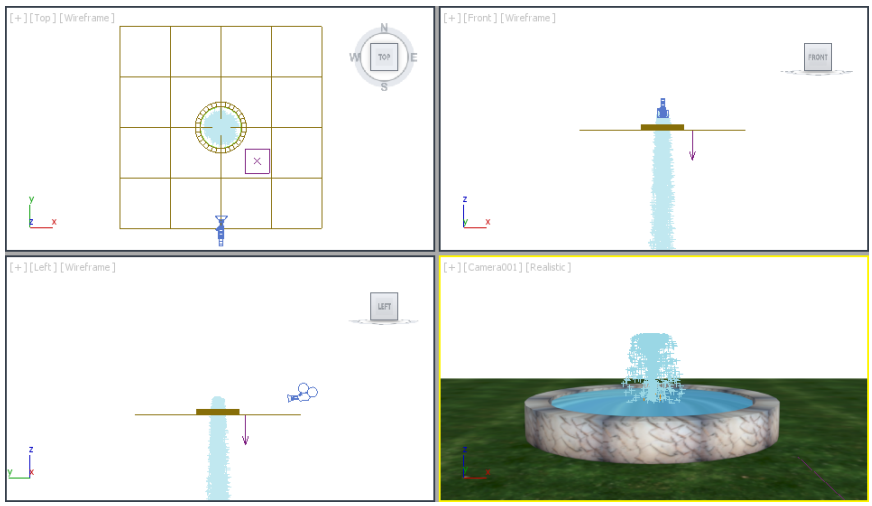


Figure 18-31 *The particles after applying the Gravity space warp*

Note

You can vary the size and position of the Gravity space warp icon as it does not affect the particles of the particle system.

After applying the Gravity space warp, the particles start moving downward but they go under the *ground*, refer to Figure 18-31. To avoid this, you need to apply a Deflector space warp to the particle system.

15. Activate the Top viewport. Make sure that **Create > Space Warps** is selected in the **Command Panel**. Select the **Deflectors** category in the drop-down list below the **Space Warps** button. Next, invoke the **Deflector** tool from the **Object Type** rollout.

16. In the Top viewport, press and hold the left mouse button, drag the cursor from one point to another, and then release the left mouse button; the **Deflector** space warp icon is displayed in all viewports.

17. Select *fountain01* in any viewport and invoke the **Bind to Space Warp** tool from the **Main Toolbar**. Now, bind *fountain01* with the Deflector space warp icon.

18. Invoke the **Select and Move** tool and select the Deflector space warp icon.

19. Choose the **Modify** tab in the **Command Panel** and set the values in the **Parameters** rollout as follows:

    Bounce: **0.2** Friction: **1.0**
    Width: **2500** Length: **2500**

20. Align the **Deflector** space warp icon in the Top viewport, as shown in Figure 18-32. As you align the **Deflector** space warp icon, the position of the particles also changes.

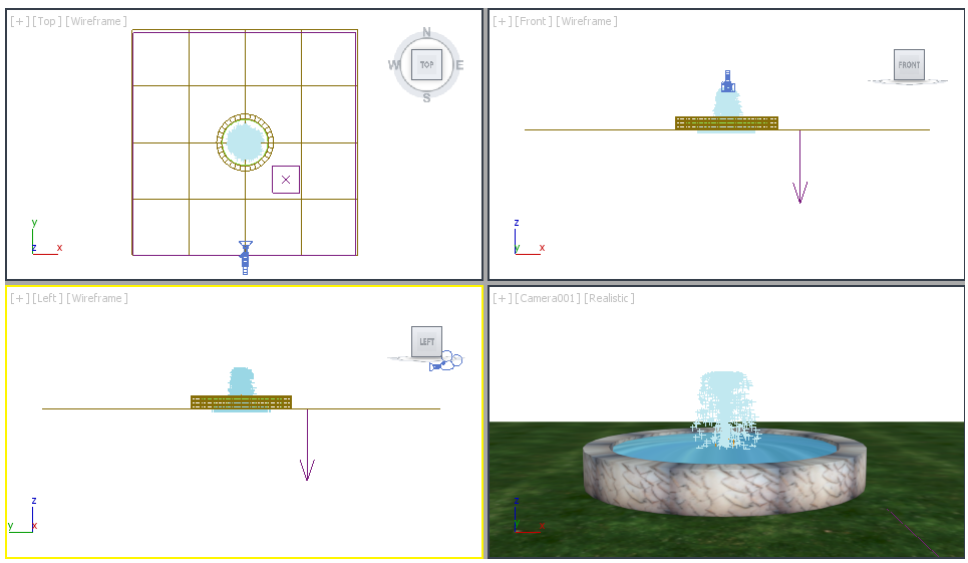


Figure 18-32 *The particles after applying the* ***Deflector*** *space warp*

After colliding with the Deflector space warp, some of the particles of *fountain01* start moving outward. Therefore, you need to modify the settings of *fountain01*.

21. Select *fountain01* in the viewport and choose the **Modify** tab in the **Command Panel**. In the modifier stack, select the **Super Spray** option; various rollouts are displayed in the Modify panel.

22. Expand the **Particle Spawn** rollout and select the **Die After Collision** radio button in it. As a result, the particles will die after colliding with the **Deflector** space warp icon, as shown in Figure 18-33.

23. Activate the Camera001 viewport and invoke the **Render Production** tool; the scene displayed after rendering is shown in Figure 18-34.

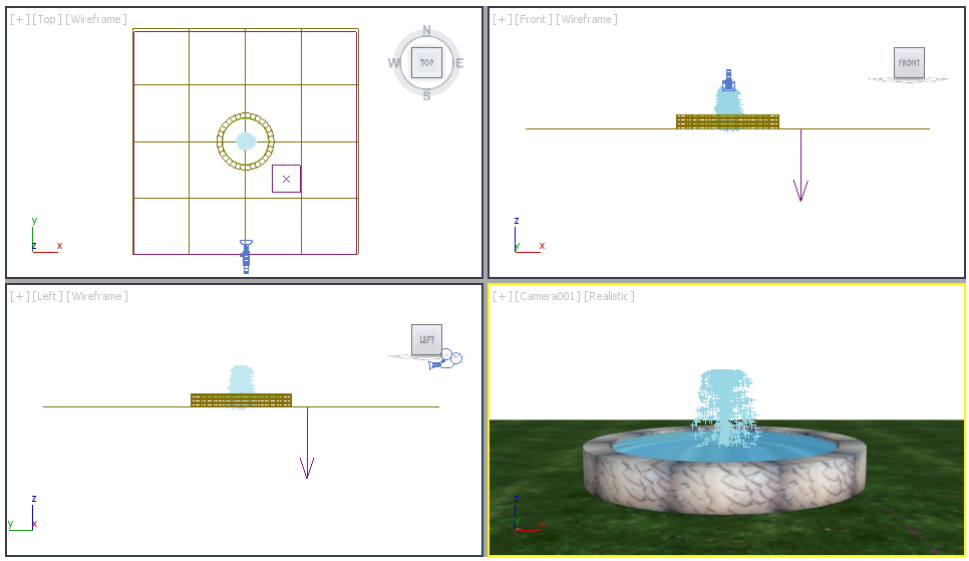


Figure 18-33 *The particles after modifying the settings of the* ***Deflector*** *space wrap*

Next, to make *fountain01* realistic, you need to apply the **Motion Blur** rendering effect to it.

24. Select *fountain01* in any viewport and right-click on it; a quad menu is displayed. Choose the **Object Properties** option; the **Object Properties** dialog box is displayed. Next, select the **Image** radio button in the **Motion Blur** area; the **Multiplier** spinner is activated in this area. Set the value **8.0** in this spinner and choose the **OK** button to exit the dialog box.

25. Activate the Camera001 viewport and invoke the **Render Production** tool; the scene is displayed, as shown in Figure 18-35.

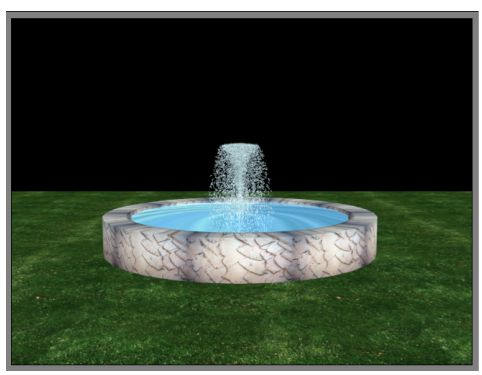


Figure 18-34 *The scene after rendering*

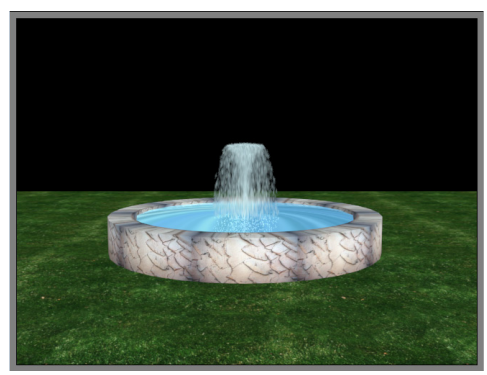


Figure 18-35 *The rendered scene after applying the motion blur effect*

Next, you need to create other fountains.

26. Select *fountain wall* and invoke the **Zoom Extents All Selected** tool.

27. Select *fountain01* in the Top viewport and create its four copies. They are automatically named as *fountain002*, *fountain003*, *fountain004*, and *fountain005*. Next, align them in the Top viewport, as shown in Figure 18-36.

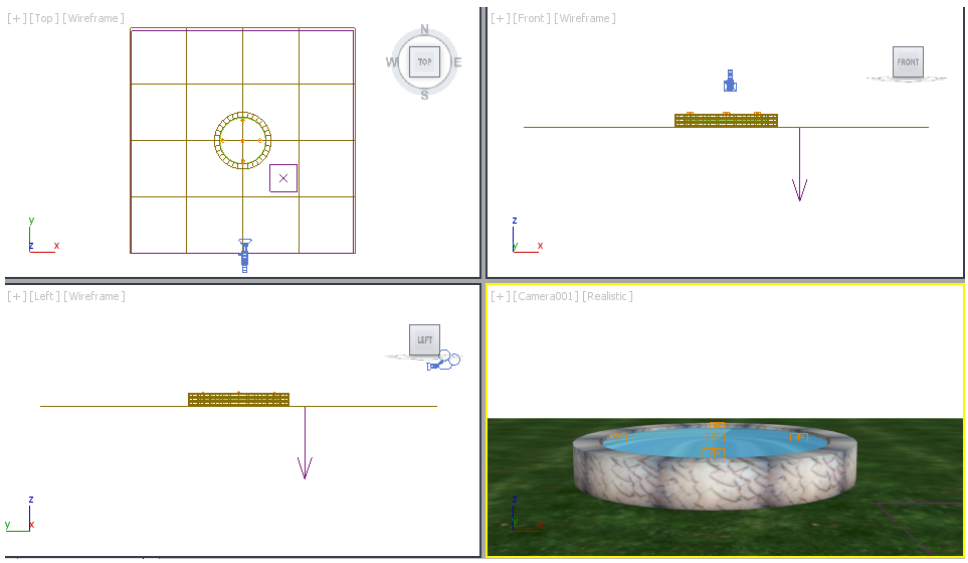


Figure 18-36 *The four copies of the fountain01 after alignment*



Note

All copied fountains are bound to the Gravity and Deflector space warps.

Next, to generate some variations in *fountain002*, *fountain003*, *fountain004*, and *fountain005*, you need to create another Gravity space warp.

28. Select *fountain002* in any viewport. In the modifier stack, select the **Gravity Binding (WSM)** option and then choose the **Remove modifier from the stack** button; the **Gravity Binding (WSM)** option is deleted.

29. Repeat step 28 for *fountain003*, *fountain004*, and *fountain005*.

30. In the Top viewport, create a **Gravity** space warp icon using the **Gravity** tool from the **Forces** category. It is automatically named as *Gravity002*. Bind it with *fountain002*, *fountain003*, *fountain004*, and *fountain005* using the **Bind to Space Warp** tool.



Tip: *Before binding the Gravity002 space warp with the fountain002, fountain003, fountain004, and fountain005, move the time slider to frame 0. It will help you to bind the fountains easily.*

31. Invoke the **Select and Move** tool, select *Gravity002* space warp, and choose the **Modify** tab in the **Command Panel**. In the **Parameters** rollout, set the value **10** in the **Strength** spinner.

32. Choose the **Go to End** button in the animation playback controls and render the **Camera001** viewport; the scene is displayed, as shown in Figure 18-37.



Figure 18-37 *The scene after rendering*

Creating Plants, Park, and Railings

In this section, you will create plants, park, and railings in the scene.

1. Create the plants of your choice by invoking the **Foliage** tool from **Create > Geometry > AEC Extended > Object Type** rollout. Now, create plants using **Banyan tree**.

2. Create railings all around the ground by invoking the **Railing** tool from **Create > Geometry > AEC Extended > Object Type** rollout.

3. Create the park benches as discussed in Tutorial 2 of Chapter 2 and align them, as shown in Figure 18-38. Alternatively, you can import the park bench by using the **Import** option from the **Application** menu and then by creating its clone, refer to Figure 18-38.

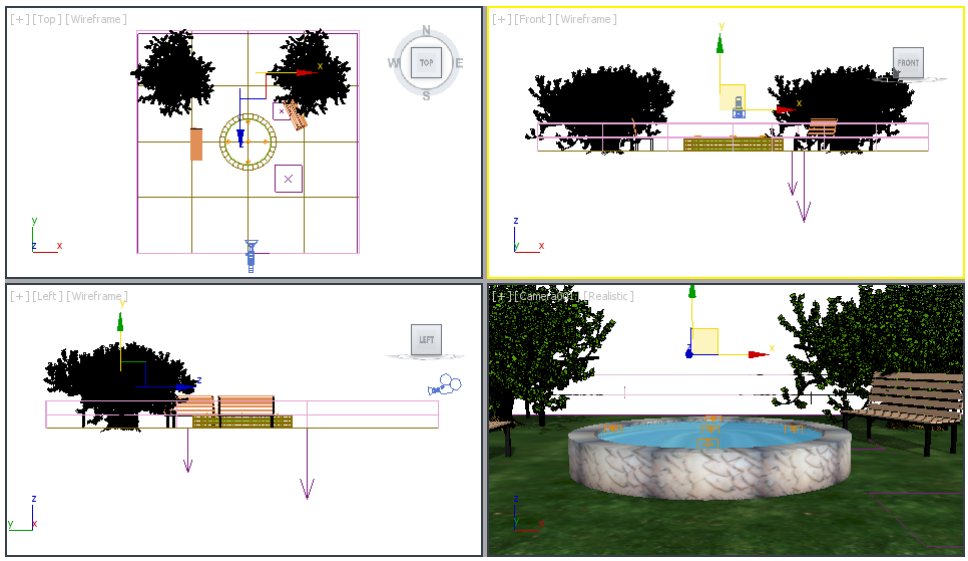


Figure 18-38 *The plants, railings, and park benches in the scene after the alignment*

Next, you need to assign lights to the scene.

Creating Lights

In this section, you will create lights to illuminate the scene.

1. Select *fountain wall* in the viewport and invoke the **Zoom Extents All Selected** tool.

2. Activate the Top viewport and invoke the **Omni** tool from **Create > Lights > Standard > Object Type** rollout. Click in the Top viewport to create the omni light and align it in all viewports, as shown in Figure 18-39. It is automatically named as *Omni01*.

3. Make sure that *Omni01* is selected. Choose the **Modify** tab in the **Command Panel**.

4. Expand the **Intensity/Color/Attenuation** rollout and choose the color swatch on the right of the **Multiplier** spinner; the **Color Selector: Light Color** dialog box is displayed. Enter the values given next to modify the color of the light.

   Red: **196** Green: **241** Blue: **243**

   Choose the **OK** button to close the dialog box.

5. In the **General Parameters** rollout, choose the **Exclude** button; the **Exclude/Include** dialog box is displayed. Now, exclude the park benches and plants from the light effect.

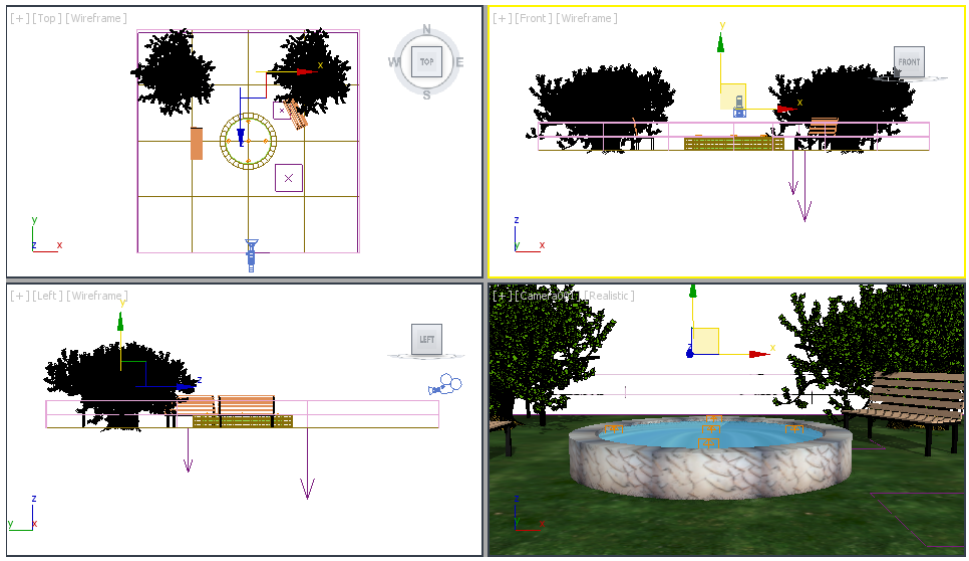


Figure 18-39 *The Omni01 light in viewports after the alignment*



Note

You can exclude or include objects from the light effect depending on the effects to be generated in the scene.

6. Create three copies of *Omni01* light in the Top viewport and align them, as shown in Figure 18-40. Make sure that the park benches and plants are excluded from the effect of the copied lights.

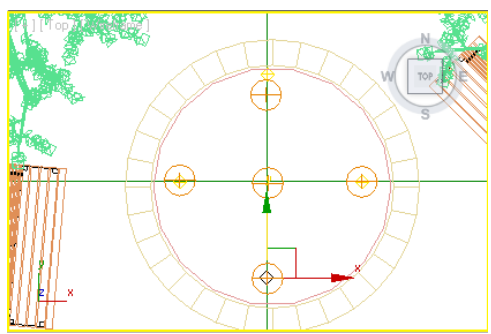


Figure 18-40 *All omni lights aligned in the Top viewport*

Next, create the lights for the entire scene.

7. Invoke the **Zoom Extents All** tool and activate the Top viewport.

8. Invoke the **Zoom All** tool and zoom out in any viewport, except the Camera001 viewport, till all the objects are displayed to half of their size, refer to Figure 18-41.

9. Invoke the **Omni** tool. In the Top viewport, click at the upper-right and lower-left corners to create two more omni lights. Align them in all viewports, as shown in Figure 18-41.

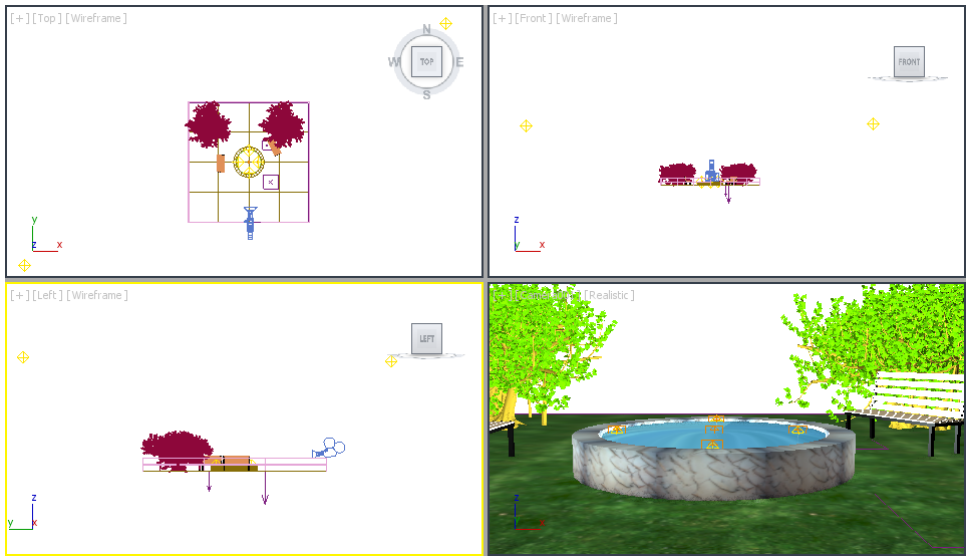


Figure 18-41 *The omni lights in viewports after the alignment*

10. In the Modify panel, select the **On** check box from the **Shadows** area of the **General Parameters** rollout. Next, select the **Ray Traced Shadows** option from the drop-down list located below the **On** check box.

    You can also create more lights depending on the requirement of the scene.

11. Choose the **Go to End** button in the animation playback controls and render the Camera001 viewport; the scene is displayed, as shown in Figure 18-42.

Creating the Environment for the Scene

In this section, you will create the environment for the scene.

1. Create the environment for the scene as discussed in Tutorial 2 of Chapter 14.

2. Choose the **Go to End** button in the animation playback controls. Render the Camera001 viewport; the scene is displayed with the stars in the sky, as shown in Figure 18-43.

Saving and Rendering the Scene

In this section, you will save the scene and then render it. You can also view the final rendered image of this model by downloading the file *c18_3dsmax_2024_rndr.zip* from *www.cadcim.com*. The path of the file is as follows:*Textbooks > Animation and Visual Effects > 3ds Max > Autodesk 3ds Max 2024: A Comprehensive Guide*

1. Choose **Save** from the **Application** menu.

2. Invoke the **Render Setup** tool from the **Main Toolbar**; the **Render Setup: Default Scanline Renderer** dialog box is displayed. The **Common** tab is chosen by default.



Figure 18-42 *The scene at rendering after assigning the lights*



Figure 18-43 *The scene with the environment after rendering*

3. Set the values in the **Render Setup: Default Scanline Renderer** dialog box as discussed in Tutorial 1 of Chapter 14 and then choose the **Render** button; the **Camera001, frame** and the **Rendering** dialog boxes are invoked, and they display the rendering process.

   After the completion of rendering, the final output of the animation is saved in the *avi* format at a location specified by you. You can view the final output of the animation by opening the corresponding *avi* file.

Tutorial 2

In this tutorial, you will create a scene displaying smoke rising from an incense stick, as shown in Figure 18-44. **(Expected time: 45 min)**

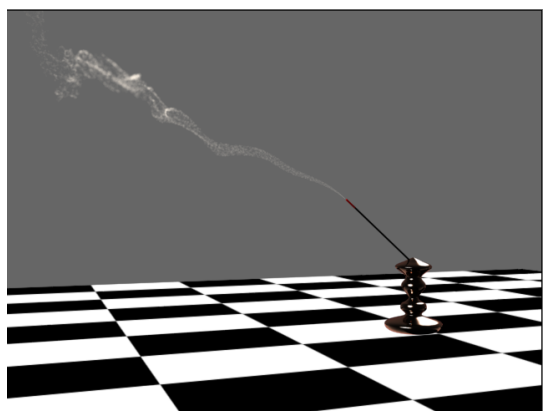


Figure 18-44 *The smoke rising from an incense stick*

The following steps are required to complete this tutorial:

a. Create the project folder.
b. Create the scene.
c. Create smoke.
d. Assign the material to the smoke.
e. Create lights.
f. Create the environment.
g. Save and render the scene.

Creating the Project Folder

Create a new project folder with the name *c18_tut2* at *\Documents\3dsmax2024* and then save the file with the name *c18tut2*, as discussed in Tutorial 1 of Chapter 2.

Creating the Scene

In this section, you will create a floor and stand for incense stick in the scene.

1. Invoke the **Plane** tool from **Standard Primitives** in the **Command Panel** and create a plane in the Top viewport. Set the values in the **Parameters** rollout as follows:

   Length: **1239.908** Width: **1957.291**

2. Modify the name of the plane to **floor**.

3. Press the M key; the **Material Editor** dialog box is displayed.

4. Select the **01-Default** sample slot and modify its name in the **Material Name** text box to **floor material**.

   Next, you need to assign a map.

5. In the **Blinn Basic Parameters** rollout, choose the **Diffuse** map button on the right side of the **Diffuse** color swatch; the **Material/Map Browser** dialog box is displayed. Select the **Checker** map from the **Maps > Standard** rollout and choose the **OK** button; the selected map is displayed in the sample slot. Also, the rollouts are displayed to modify the coordinates of the map.

6. In the **Coordinates** rollout, set the value **5** in both the **U Tiling** and **V Tiling** spinners.

7. Make sure that *floor* is selected in the viewport and then choose the **Assign Material to Selection** tool; the *floor material* is assigned to *floor* in the viewport. Also, choose the **Show Shaded Material in Viewport** tool to display the assigned material in the viewport. Close the **Material Editor** dialog box.

   Next, you need to create a stand for the incense stick.

8. Invoke the **Line** tool from **Create > Shapes > Splines > Object Type** rollout in the **Command Panel**. Create a line in the Front viewport, as shown in Figure 18-45.

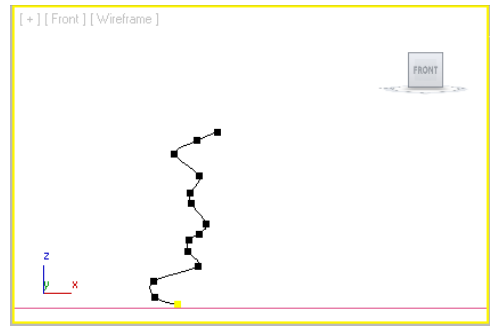


Figure 18-45 *A line for creating the incense stick stand*

9. Create an incense stick stand by applying the **Lathe** modifier to the line as discussed earlier in Tutorial 1 of Chapter 6. Note that before applying the **Lathe** modifier, you need to adjust the pivot point according to the shape you want to create. Now, assign a material of your choice to the incense stick stand.

10. Create a free camera in the Front viewport.

11. Create an incense stick using the **Capsule** tool from **Extended Primitives** in the **Command Panel**. Set its parameters according to the requirement of the scene. Align it in the viewports with the incense stick stand, as shown in Figure 18-46. Also, align the free camera in the viewports, as shown in Figure 18-46. Next, press the C key in the Perspective viewport to view the camera view.

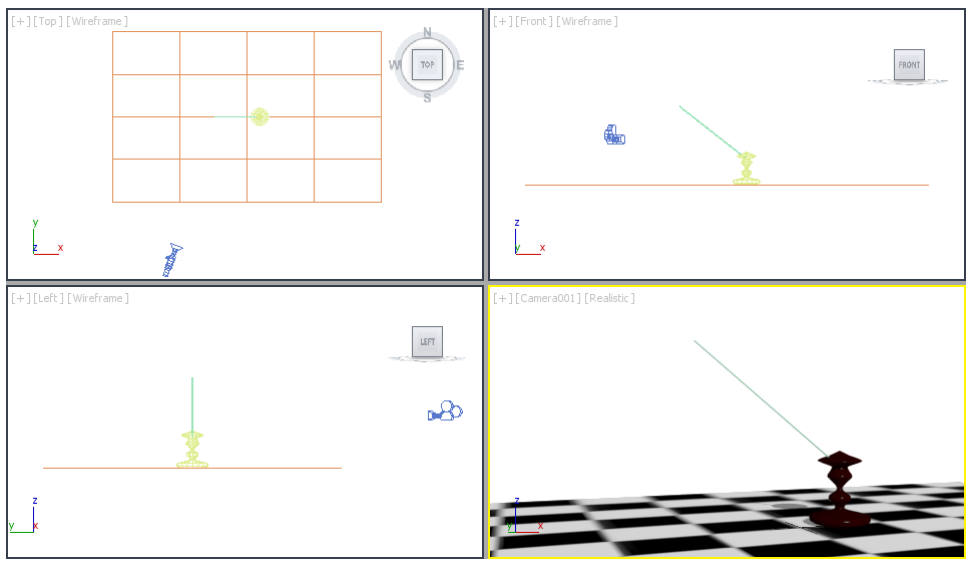


Figure 18-46 *The incense stick stand and the free camera aligned in viewports*

Creating Smoke

In this section, you will create the smoke by using the **Super Spray** tool.

1. Select the incense stick stand and invoke the **Zoom Extents All Selected** tool.

2. Activate the Top viewport and invoke the **Super Spray** tool from **Create > Geometry > Particle Systems > Object Type** rollout in the **Command Panel**.
3. In the Top viewport, press and hold the left mouse button, drag the cursor from one point to another, and release the left mouse button; an emitter is created. Now, align the emitter in all viewports using the **Select and Move** and **Select and Rotate** tools, as shown in Figure 18-47.

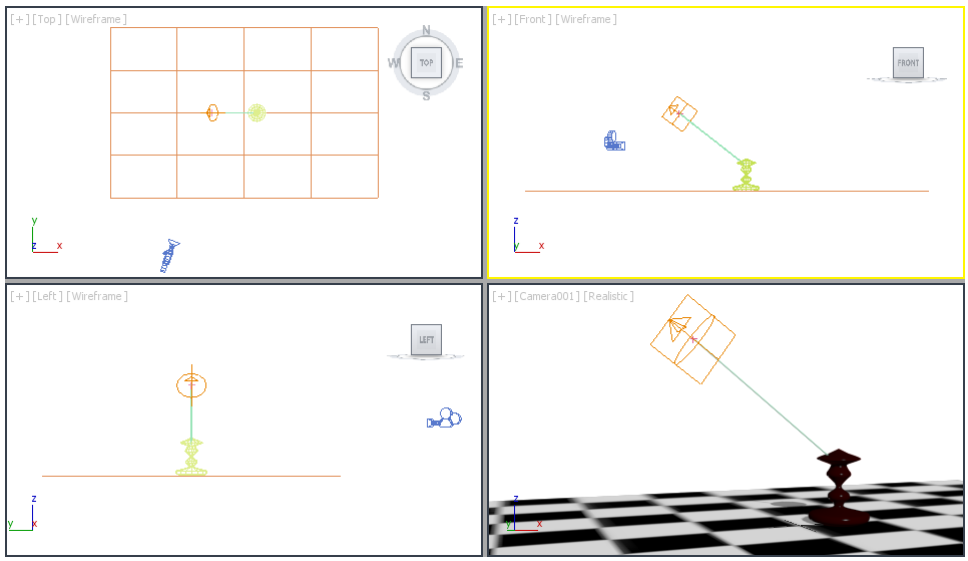


Figure 18-47 *The emitter for Super Spray particle system aligned in viewports*

4. Modify the name of the particle system to *smoke*.

5. Increase the number of frames in the track bar to **300** as discussed in Tutorial 1 of this Chapter.

   Next, you need to set the parameters of *smoke* by using different rollouts.

6. Make sure that *smoke* is selected in the viewport and choose the **Modify** tab in the **Command Panel**; various rollouts are displayed.

7. In the **Basic Parameters** rollout, set the parameters as follows:

   Particle Formation area
   Off Axis: **0.0** Spread: **4.0**

   Viewport Display area
   Select the **Dots** radio button.

8. In the **Particle Generation** rollout, set the parameters as follows:

Particle Quantity area
Make sure that the **Use Rate** radio button is selected. Next, set the value **30** in the spinner located below this radio button.

Particle Motion area
Speed: **1.5**

Particle Timing area

Emit Start: **30**	Emit Stop: **300**
Display Until: **300**	Life: **225**

Particle Size area

Size: **2.5**	Variation: **30**
Grow For: **90**	Fade For: **30**

9. In the **Particle Type** rollout, select the **Facing** radio button from the **Standard Particles** area.

10. In the **Rotation and Collision** rollout, set the parameters as follows:

Spin Time: **60** Variation: **20.0**

11. Activate the Camera001 viewport and choose the **Play Animation** button; the particles start moving in a single direction, as shown in Figure 18-48.

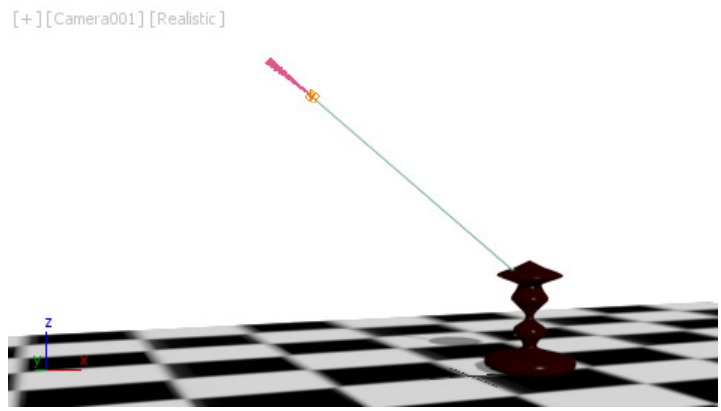


Figure 18-48 *The particles in the Camera001 viewport at one frame*

Next, you need to create the Wind space warp to generate variation in the motion of particles.

12. Activate the Left viewport. Invoke the **Wind** tool from **Create > Space Warps > Forces > Object Type** rollout in the **Command Panel**.

13. Press and hold the left mouse button and drag the cursor in the Left viewport; the Wind space warp icon is displayed.

14. Align the **Wind Space Warp** icon in the viewports using the **Select and Move** tool, refer to Figure 18-49.

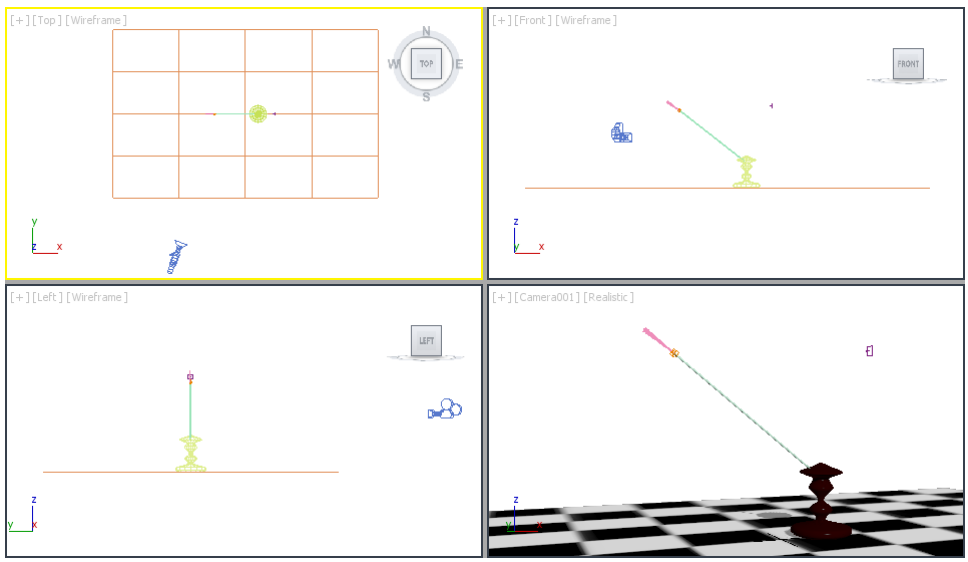


Figure 18-49 *The Wind space warp icon aligned in viewports*

15. Choose the **Modify** tab in the **Command Panel** and set the values in the **Parameters** rollout of the Wind space warp as follows:

Force Area
Strength: **3**

Wind Area
Turbulence: **1** Frequency: **0.1** Scale: **0.2**

16. Select *smoke* in any viewport, invoke the **Bind to Space Warp** tool from the **Main Toolbar**, and then bind *smoke* with the Wind space warp icon; the direction of the particles is changed, as shown in Figure 18-50. Invoke the **Select Object** tool to exit the command.

Next, you need to create the Drag space warp to adjust the velocity of *smoke* particles.

17. Activate the Top viewport and invoke the **Drag** tool from **Create > Space Warps > Forces > Object Type** rollout in the **Command Panel**.

18. Press and hold the left mouse button and drag the cursor in the Top viewport; the Drag space warp icon is displayed.

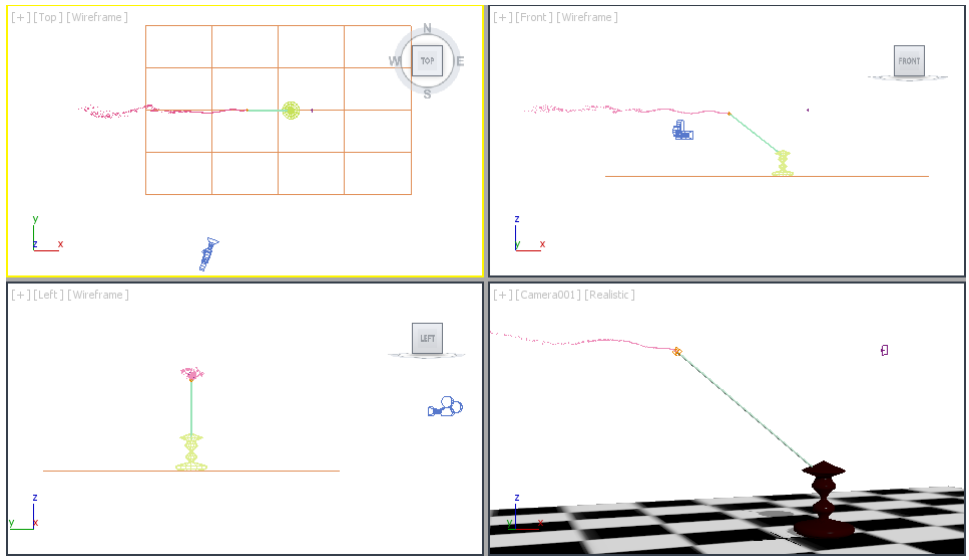


Figure 18-50 *The smoke after binding with the Wind Space Warp icon in viewports*

19. Align the Drag space warp icon in the viewports using the **Select and Move** tool, refer to Figure 18-51.

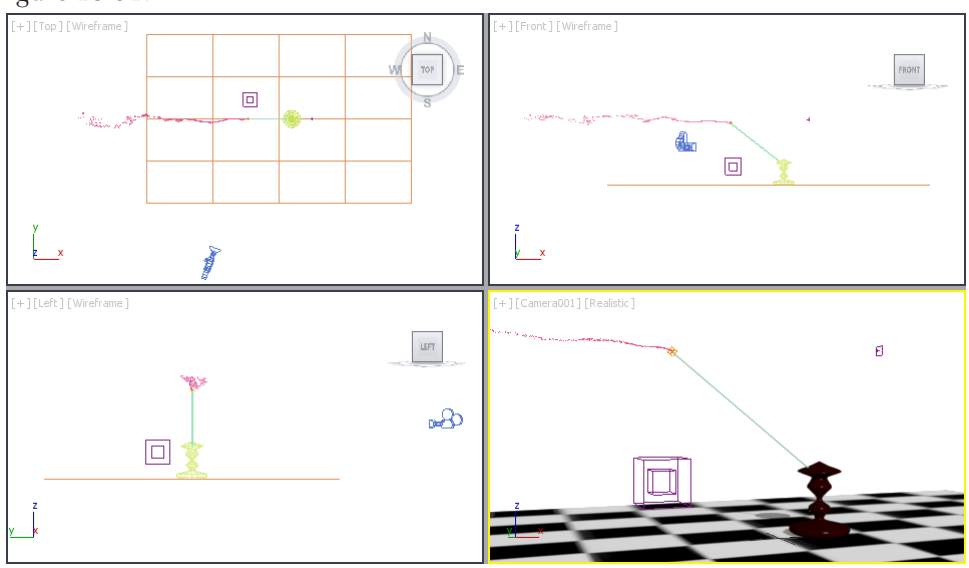


Figure 18-51 *The Drag space warp icon aligned in viewports*

20. Choose the **Modify** tab in the **Command Panel** and set the values in the **Parameters** rollout of the Drag space warp as follows:

Timing area
Time On: **0** Time Off: **300**

Damping Characteristics area
Select the **Cylindrical Damping** radio button and set the parameters as follows:

Radial: **3.0** Tangential: **1.0** Axial: **2.0**

21. Select *smoke* in any viewport, invoke the **Bind to Space Warp** tool from the **Main Toolbar**, and then bind the it with the drag space warp icon; the velocity of particles is changed, as shown in Figure 18-52.

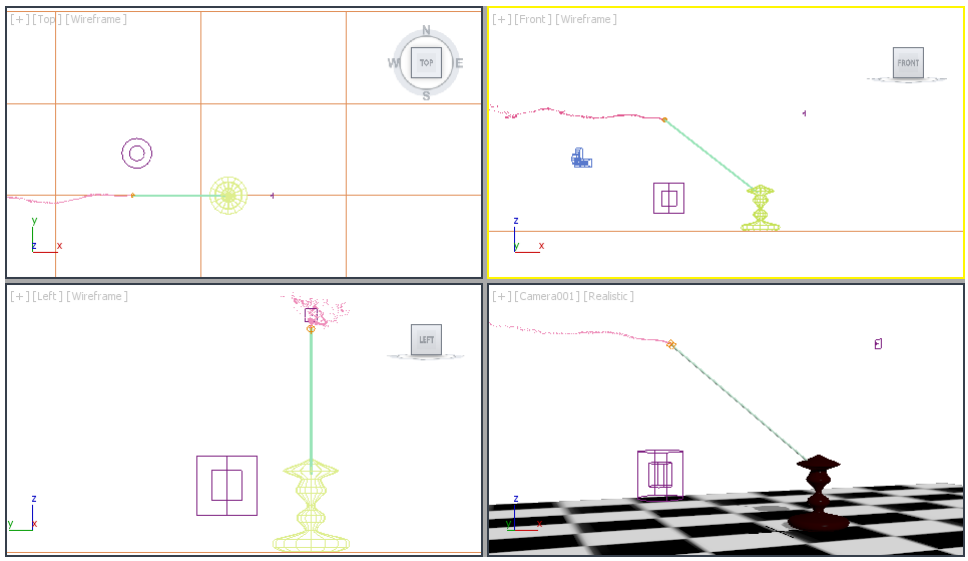


Figure 18-52 *The smoke after binding with the Drag space warp icon in viewports*

Asigning the Material to Smoke

In this section, you will assign the material to *smoke*.

1. First, select *smoke* in any viewport and press the M key; the **Material Editor** dialog box is displayed.

2. Select a sample slot to which no material has been assigned and modify its name in the **Material Name** text box to **smoke material**.

3. In the **Shader Basic Parameters** rollout, make sure that the **Blinn** option is selected in the drop-down list. Select the **Face Map** check box.

4. In the **Blinn Basic Parameters** rollout, select the **Diffuse** color swatch and set the white color.

5. In the **Self-Illumination** area of the **Blinn Basic Parameters** rollout, select the **Color** check box; the spinner on its right side is replaced with a color swatch. Modify the color using the color swatch by entering the parameters as follows:

   Red: **215** Green: **197** Blue: **174**

6. Set the value **0** in the **Opacity** spinner. Choose the button on the right of the **Opacity** spinner; the **Material/Map Browser** dialog box is displayed. Select the **Gradient** map from the **Maps > Standard** rollout and choose the **OK** button; various rollouts are displayed to modify the **Gradient** map.

7. In the **Gradient Parameters** rollout, set the value **1.0** in the **Color 2 Position** spinner. In the **Gradient Type** group, select the **Radial** radio button.

8. Choose the **Go to Parent** tool to go back to the parent level.

9. Expand the **Maps** rollout and set the value **3** in the **Opacity** spinner.

10. Make sure that *smoke* is selected in the viewport and choose the **Assign Material to Selection** button; the **smoke material** is assigned to *smoke* in the viewport. Close the **Material Editor** dialog box.

11. Choose the **Go to End** button from the animation playback controls and render the Camera001 viewport; the scene is displayed, as shown in Figure 18-53.

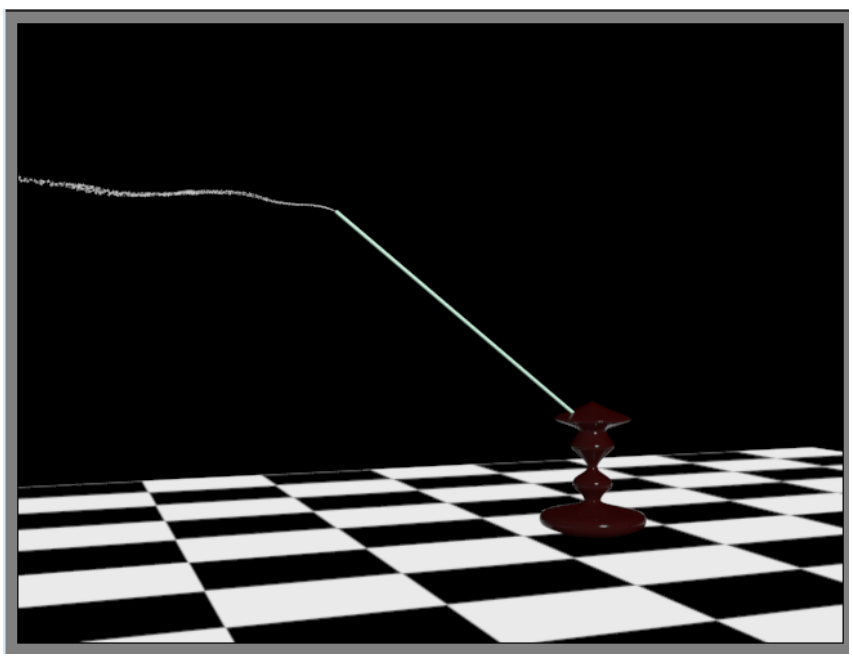


Figure 18-53 *The scene after rendering*

Creating Lights

In this section, you will create the lights by using the **Omni** tool.

1. Invoke the **Zoom Extents All** tool.

2. Activate the Top viewport and invoke the **Omni** tool from **Create > Lights > Standard > Object Type** rollout. Click on the lower left and upper right corners to create two omni lights.

3. Align the omni lights in the viewports, as shown in Figure 18-54.

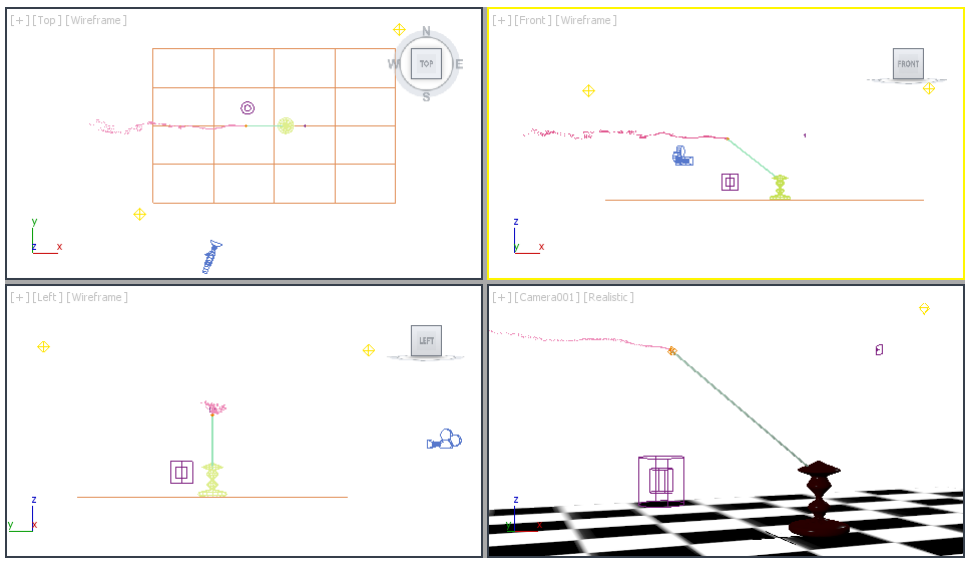


Figure 18-54 *The omni lights aligned in the viewports*

Creating the Environment

In this section, you will modify the color environment in the scene.

1. Modify the color of the environment as discussed earlier by entering the values as follows:

   Red: **102** Green: **102** Blue: **102**

2. Choose the **Go to End** button in the animation playback controls and render the Camera001 viewport. The scene is displayed with the modified color in the environment, as shown in Figure 18-55.

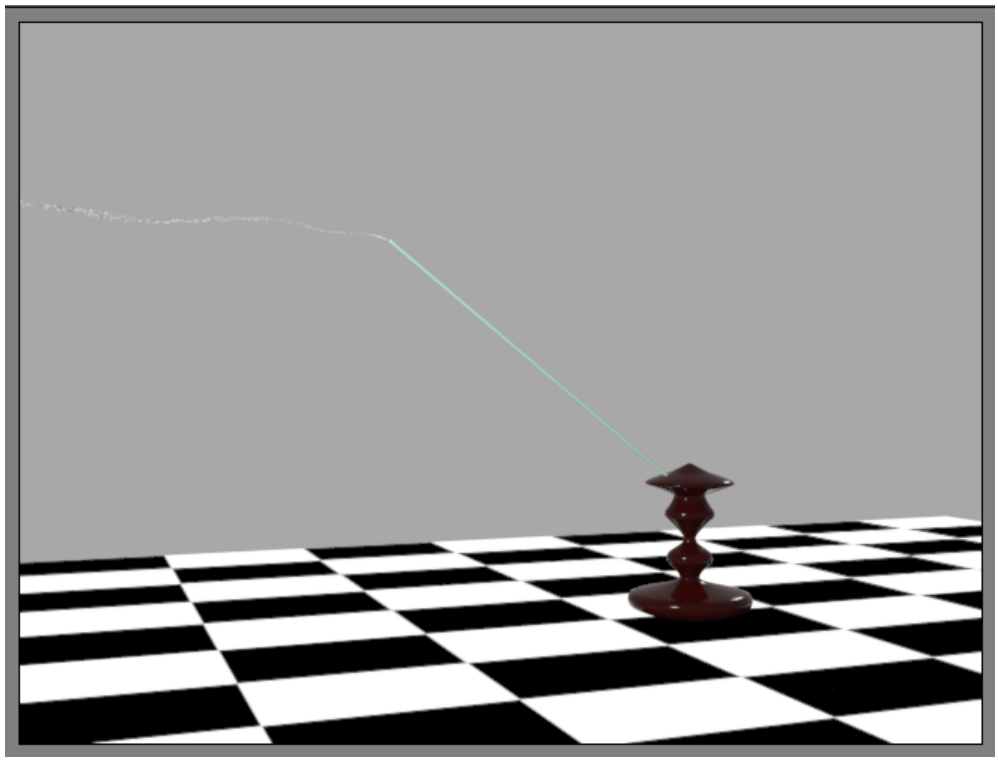


Figure 18-55 *The scene at rendering after modifying the color of the environment*

Saving and Rendering the Scene

In this section, you will save the scene and then render it. You can view the final rendered image of this model by downloading the file *c18_3dsmax_2024_rndr.zip* from *www.cadcim.com*.

The path of the file is as follows: *Textbooks > Animation and Visual Effects > 3ds Max > Autodesk 3ds Max 2024: A Comprehensive Guide*

1. Choose **Save** from the **Application** menu.

2. To view the final output of the scene, including the animation of smoke, render the scene as discussed in Tutorial 1 of Chapter 14.

   After the completion of rendering, the final output of the animation is saved in the *avi* format at a location specified by you. You can view the final output of the animation by opening the corresponding *avi* file.

Self-Evaluation Test

Answer the following questions and then compare them to those given at the end of this chapter:

1. Which of the following is a category of space warps in Autodesk 3ds Max?

   (a) **Forces** (b) **Deflectors**
   (c) **Modifier-Based** (d) All of these

2. Which of the following tools is used to create a space warp under the **Forces** category?

   (a) **Path Follow** (b) **Gravity**
   (c) Both of the above (d) None of the above

3. Which of the following space warps is used to twist the object?

   (a) Bend (b) Taper
   (c) Twist (d) Skew

4. Which of the following categories of space warps is used to deform the mesh objects?

   (a) **Forces** (b) **Deflectors**
   (c) **Geometric/Deformable** (d) All of these

5. The tools in the **Deflectors** category are used to create the space warps that reflect or refract the particles colliding with them. (T/F)

6. The tools in the **Modifier-Based** category are used to create the space warps that generate the effects similar to the object modifiers. (T/F)

7. The size and position of the deflector icon does not affect the particles of a particle system. (T/F)

8. You can use any object in the scene as a deflector using the _____ space warp.

9. The _____ space warp is used to stretch the geometry of an object along the specified axis.

10. The _____ space warp is used to offset the geometry of an object uniformly in any of the three axes.

Review Questions

Answer the following questions:

1. Which of the following space warps is used to deform an object by adjusting the control points of a lattice box?

   (a) FFD(Box) (b) FFD(Cyl)
   (c) Both of the above (d) None of the above

2. Which of the following space warps is used to explode an object into fragments?

   (a) Bomb (b) Wave
   (c) Ripple (d) PBomb

3. Which of the following space warps is used to create the wavy effect in the objects?

   (a) Wave (b) Displace
   (c) Ripple (d) Bomb

4. Which of the following tools in the **Deflector** category is used to create the spherical space warp icon?

   (a) **Deflector** (b) **SDeflector**
   (c) **POmniFlect** (d) **UDeflector**

5. The Ripple space warp is similar to the Wave space warp. (T/F)

6. The FFD(Cyl) space warp is similar to the FFD(Box) space warp with the only difference that the FFD(Cyl) space warp is cylindrical in shape. (T/F)

7. The Bomb space warp is used to explode a particle system. (T/F)

8. The _____ space warp is used to create the wavy effects in the objects that are bound to it.

9. The _____ space warp is used to create the circular and concentric waves in the objects.

10. The _____ space warp is used to explode the objects into their individual faces.

EXERCISES

The rendered output of the scene used in the following exercise can be accessed by downloading the *c18_3dsmax_2024_exr.zip* file from *www.cadcim.com*. The path of the file is as follows: *Textbooks > Animation and Visual Effects > 3ds Max > Autodesk 3ds Max 2024: A Comprehensive Guide*

Exercise 1

Create an animated scene in which an object falls into the sea and floats on it, thus creating wavy effect in the water, as shown in Figure 18-56. **(Expected time: 15 min)**

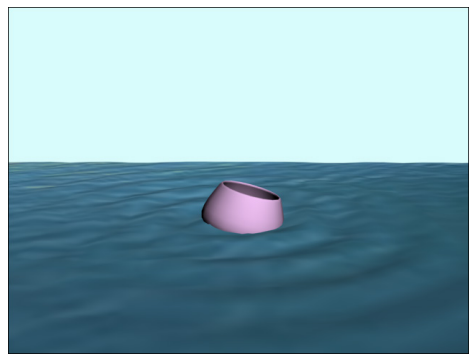


Figure 18-56 *The object floating on the sea*

Hint: Use the **Ripple** tool in the **Geometric/Deformable** category of space warps.

Exercise 2

Create an animated scene displaying the rainy effect, as shown in Figure 18-57. **(Expected time: 15 min)**



Figure 18-57 *The rainy effect*

Hint: Use the spray particle system to create the rain effect.

Answers to Self-Evaluation Test

1. d, **2.** c, **3.** c, **4.** c, **5.** T, **6.** T, **7.** F, **8.** UDeflector, **9.** Stretch, **10.** Skew