Animation Notes

These are a mixture of QuickTime and avi animations, but they have all been saved as MoviePlayer files. The avi animations will play with the Windows Media Player application by double clicking them, but you will need the QuickTime player to play the .mov animations. You can download this from http://apple.com/quicktime. The avi animations will also play in the Quicktime player.

Most of the animations need to be played in a loop, which happens automatically in the Windows Media Player, but needs to be selected in the QuickTime player.

Sections of some animations need to be stepped through frame-by-frame. Although you can't do this with the Windows Media Player, you can with the QuickTime player. After you press pause, you can step back and forward with the left and right arrow keys on the keyboard.

Below are short descriptions of each animation.

Animations by Kevin Suffern

These QuickTime animations have large file sizes because when I rendered these, they were saved with the default compression ratio of two. There was no other option at the time.

ChangingEta.mov

The scene is an opaque sphere, a transparent sphere, and a checker plane. The transparent sphere is rendered with the `Dielectric` material from Chapter 28 with a blue-green filter color. The color filtering results in the mauve sphere being rendered blue when it's seen through the transparent sphere.

The index of refraction of the transparent sphere changes from frame-to-frame, starting with eta = 0.75 (an air bubble in water) in the first frame, and ending with eta = 2.24 (a diamond in air) in the last frame. It's not exactly equal to 1.0 in any frame.

TransparentEllipsoid.mov

This shows a rotating transparent ellipsoid with η = 1.5. If you look carefully, a black strip is visible in a few frames near the edge of the ellipsoid. This is also visible in Figure 27.24 for a differently shaped ellipsoid.

Cylinder and 3D Checker

Attached.mov shows a solid cylinder that's translated and rotated with a 3D checker texture attached. **NotAttached.mov** shows a thicker cylinder moving through a stationary 3D checker texture. These animations are best shown being looped backwards and forwards. Section 30.3.2 explains how textures are attached to objects.

RotatingEarth.mov

This is a small animation of rotating sphere with an Earth map on it, and transparent oceans. The transparent material has eta = 1.0 and a faint blue filter color. See Exercise 29.7 and Figure 29.25.

Animations by Hong Nguyen

These animations were saved with higher compression ratios than my animations, and are therefore a lot smaller, but at the cost of some image quality.

Perspective Viewing

The scene is the box, sphere, and triangle from Section 8.5. **Zooming.avi** animates Figure 8.16, where the view plane distance increases with each frame, to zoom into the scene. **Distortion.avi** animates Figure 8.19 where the view plane distance remains the same, and the eye point approaches the objects. This results in increasing perspective distortion.

Spheres.avi is an animation of Figure 8.21, which also illustrates perspective distortion.

Color Filtering

RGB_Boxes.avi

The scene contains three transparent axis aligned boxes that start off completely clear, and end up with filter colors of red = (1, 0, 0), green = (0, 1, 0), and blue (0, 0, 1).

CMY_Boxes.avi

The scene contains three transparent axis aligned boxes that start off completely clear, and end up with filter colors of cyan = (0, 1, 1), majenta = (1, 0, 1), and yellow (1, 1, 0).

CMY_Disks.avi

The scene contains three transparent solid cylinders that overlap in the view direction. These start off completely clear with a white background, and end up with filter colors of cyan = (0, 1, 1), majenta = (1, 0, 1), and yellow (1, 1, 0). The overlapping parts illustrate properties of the subtractive primary colors.

Rotating Transparent Spheres

In this scene a transparent sphere rotates around a mauve sphere. The scene is similar to the one discussed in Section 27.7

In **Eta=1.5.avi**, the sphere is glass in air, and in **Eta=0.75.avi**, the sphere is an air bubble in water.

Rotating Transparent Boxes

These animations rotate the transparent box in Figure 28.21 through 90 degrees. To simulate the full 360 rotation you will have to put the player in a loop.

Eta=1.5.avi corresponds to Figure 28.21(a) where there is always total in internal reflection when rays hit an inside surface for the first time.

Eta=1.13.avi corresponds to Figure 28.21(b) where some rays get out when they hit an inside surface for the first time.

Sphere Inside a Transparent Sphere

The scene here is similar to that shown in Figures 28.27 – 28.29, where a small reflective sphere is inside a solid transparent sphere. In the animations, both spheres rotate through 360 degrees, although you can't see the rotation of the solid sphere.

In **SphereInGlass.avi**, the transparent sphere has eta = 1.5, and in **SphereInDiamond.avi**, eta = 2.42. The material is the `Transparent` material from Chapter 27 instead of the `Dielectric` material from Chapter 28, which was used in Figures 28.28 and 28.29.

These animations allow you to see something that's not apparent from Figures 28.2 8 and 28.29. A "ghost" image of the red sphere rotates with it. You can see this as a thin red crescent on the far left in Figure 28.28 (c) and (d), and to the right of the large red crescent in Figure 28.29 (a). It's more apparent when you look at the images on your computer screen. How is this formed?

Camera Inside a Transparent Sphere

These two animations are for Section 28.6.3 **Camera Inside a Transparent Sphere**. In **FlyThrough.mov** the camera approaches a diamond sphere surrounded by a ring of red spheres, flies through the sphere in a straight line through the center, and then comes out the other side. For most of this animation, things happen very quickly, and you should step through it, one frame at a time. Even so, it's difficult to work out what is happening, as there are so many optical effects. This is a situation where ray visualization software, as illustrated in Figure 27.24(b), would help.

In **Rotating.avi** the camera is inside the sphere at (0, 0, 2), and rotates through 360 degrees while keeping the view direction horizontal.

These two animations were rendered without using the eta squared factor discussed in Section 27.4

WhiteNoise.avi

This is a moving sphere where the noise-based texture's `get_color` function just calls `rand_float`.

MarbleForming.mov

This starts with a marble texture that has no turbulent mixing: a = 0.0 in Equation (31.10), and ends with a = 4.0.