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"WebTOP: Interactive 3D Optics Simulations on the Web"

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Appendix A: Members of the WebTOP team

Appendix B: Installing WebTOP from a CD ROM

1. Welcome to WebTOP

Please open the WebTOP folder on your computer desktop, and double click on the index.html document. You will get the "About" page pictured below. This page tells you a little about WebTOP and provides you with links to the WebTOP modules via the Modules menu on the black bar at the top of the page. There are currently five modules available: Fresnel Single Slit, Fresnel Circular, Rayleigh Resolution, Fraunhofer N-Slit, and Polarization. We will start with the Fresnel Single Slit module. Please do a left mouse click on that title on the Modules menu.

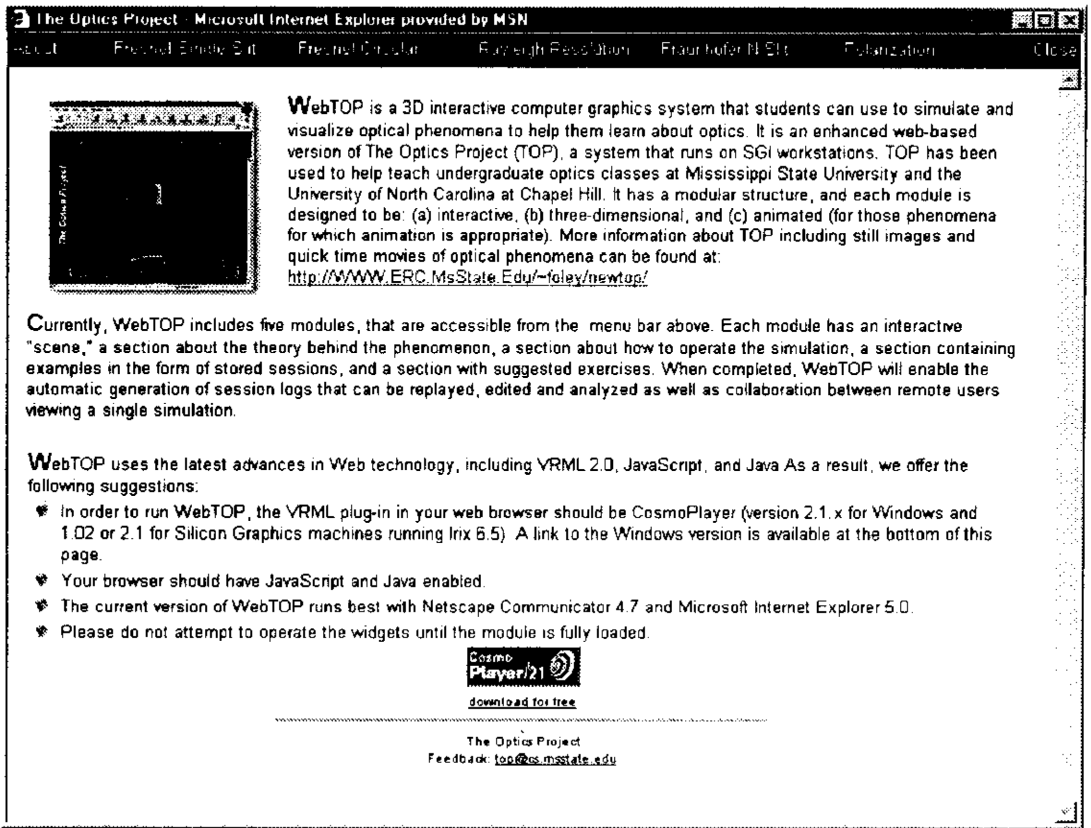

Figure 1 The WebTOP About page.

2. The WebTOP Window

Your window should now look like Figure 2 below.

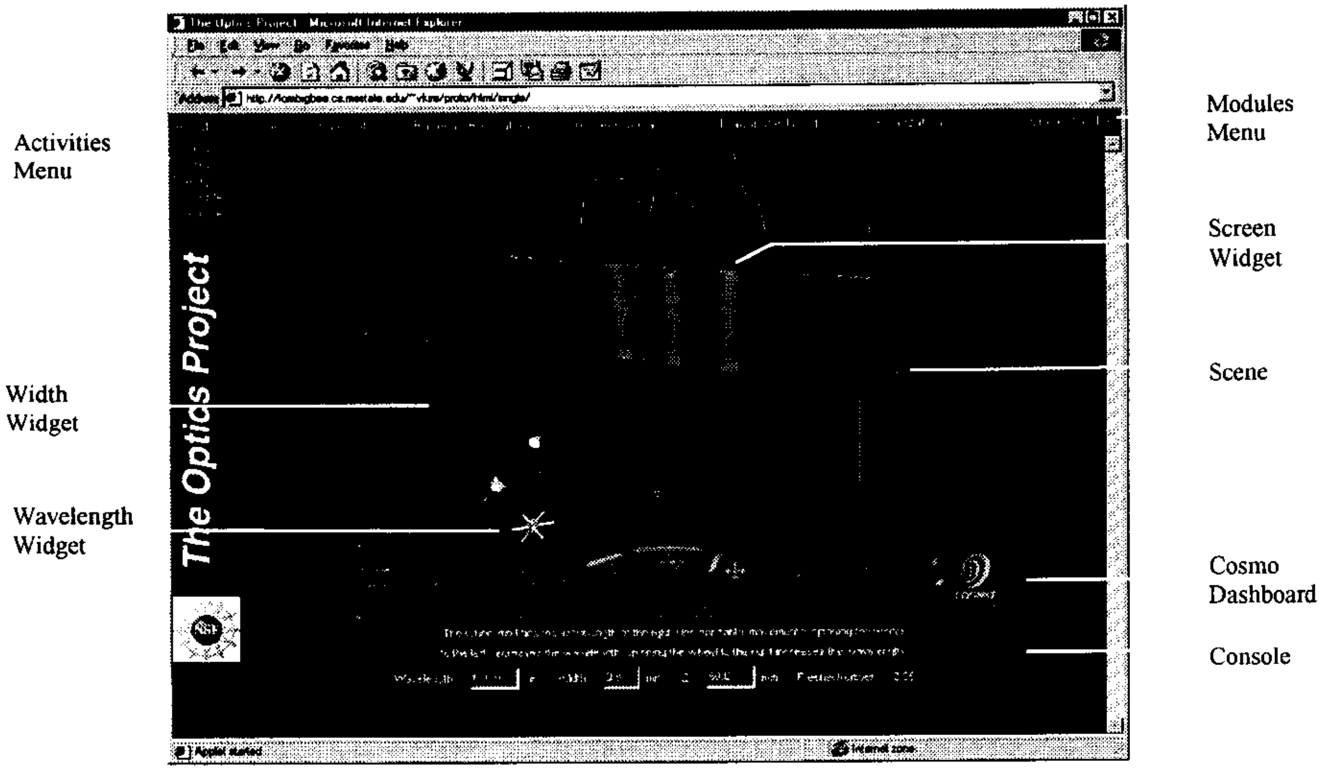

Figure 2. The WebTOP window for the Fresnel Single Slit Module.

The WebTOP window for each module has five basic parts: the Modules Menu, the Scene, the Dashboard, the Console, and the Activities Menu (see Fig. 2).

2.1 The Modules Menu

The Modules Menu is located at the top of the window. It allows the user to change to a different module by simply clicking on the module's name.

2.2 The Scene

The Scene is the interactive 3D simulation itself and occupies the largest part of the Web page. It usually consists of a light source, variety of optical elements, and an observation screen.The parameters of these items can be modified either by direct manipulation of the "widgets" in the scene, or by typing the desired parameter values into the appropriate keyboard entry boxes in the Console.

For example, in the Fresnel Single Slit module (see Figure 2) the scene consists of a single slit, an observation screen, and three kinds of widgets that allow the user to change the parameters of the simulation. In this module a monochromatic plane wave of wavelength λ is normally incident upon a slit of width w. The resulting diffraction pattern is observed on an observation screen which is a distance z from the plane that contains the slit.

The parameters λ, w, and z can be changed either by typing the desired values into the appropriate keyboard entry box on the Console, or by manipulating the appropriate widget in the Scene. Spinning the Wavelength widget (the wheel which is located in front of the aperture) changes the wavelength. Pulling on the Width widget (the red double cone on the edge of the slit) changes the diameter of the aperture. Pulling on the Screen widget (the red double cone on the top of the observation screen) changes z. These widgets are labeled in Fig. 2.

Let's learn how to use a widget, for example the Width widget. Place your mouse cursor over the red double cone widget on the right edge of the slit. The cursor will change "modes" from its Rotate mode (we will discuss the Rotate mode in the next section), which looks like to its Select Control mode, which looks like . If you now depress the left mouse button and hold it down, the cursor will change to its Change Parameter mode, which looks like . With the left mouse button held down, drag the widget to the left to close the slit, or to the right to open it. Note that down in the Console at the bottom of the window, the value of Width (the slit width) automatically updates when you use the widget to change the slit width.

Exercise 2.1

(a) Try changing the position of the observation screen by using the Screen widget.

(b) Try changing the wavelength of the light by pulling horizontally (to the left or the right) on the Wavelength widget.

2.3 The Dashboard

WebTOP uses a Virtual Reality Modeling Language (VRML) file to display and allow manipulation of the 3D Scene. In order to run WebTOP you must have a VRML browser plug-in associated with your regular Web browser (either Microsoft Internet Explorer or Netscape). We strongly recommend the CosmoPlayer VRML browser. The CosmoPlayer Dashboard is shown in Fig. 3 below.

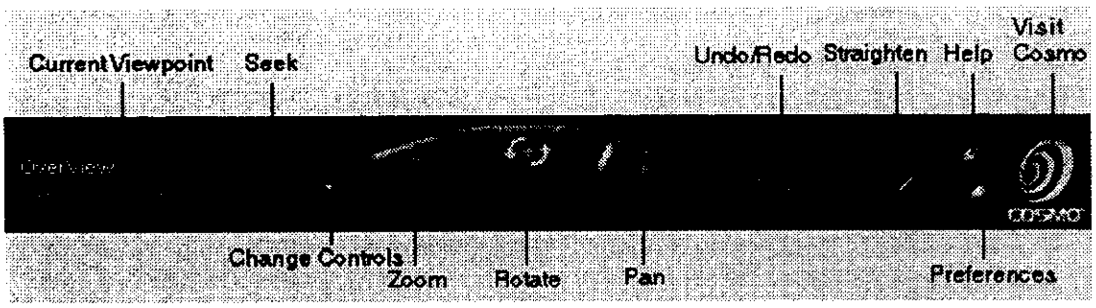

Figure 3 The CosmoPlayer Dashboard.

The main dashboard controls you will be using with WebTop are Zoom, Rotate, Pan, UndoRedo, and Home. The"active" mode of the cursor appears "lit" on the dashboard e.g., Rotate is the active mode in Fig. 3. To change to another mode, just click on the corresponding symbol on the dashboard.

To actually perform the desired manipulation, you must place the cursor over the scene, depress the left mouse button, and drag the cursor in the appropriate direction.

Let's try these controls.

Exercise 2.2

(a) With the cursor in the Rotate mode, place it on the Scene. Now depress the left mouse button, and pull horizontally to the right. The whole scene will rotate about the vertical axis.

(b) Try Pan, and then Zoom. With Pan, you may translate the scene in any direction by dragging the cursor in the desired direction. With Zoom you can zoom in by "pushing" the cursor into the Scene, or zoom out by pulling it out of the Scene.

(c) Sometimes you will do a manipulation and immediately regret the fact that you did it. For example, do a rotation of the scene to an undesirable position. Now click on the Undo/Redo button. It will undo your last manipulation.

(d) Sometimes you will do a series of manipulations, and decide you would rather have the scene in the situation in which it started. To accomplish this, go to the Current Viewpoint menu on the left-hand side of the Dashboard and choose Home. The scene will then return to its home position.

2.4 The Console

The Console is at the bottom of the window (see Fig. 2). It has three functions. First, it tells the user the current values of the input parameters, and the values of other important parameters. For example, in Figure 2, the Console is reporting that the values of the input parameters are wavelength = 540 nm, slit width = 0.60 mm, and z = 50 mm, and that the value of the Fresnel number,

$$N_F = \frac{w^2}{4\lambda z}, \qquad (2.1)$$

is 3.33.

The second purpose of the console is that it allows us to change the input parameters. Let's change the wavelength from it's current value to 700 nm. To do this, delete the number shown in the Wavelength box in the Console. Now type in 700 and hit the Enter key. WebTOP will now recalculate everything, and change the Scene to correspond to the new wavelength.

The third thing the Console does is that it gives the user help messages concerning the use of the widgets to change parameters. To see this, place the cursor over the wheel, as you would if you wanted to change the wavelength of the incident light. When you do this, a message (in yellow letters) appears at the top of the Console saying, "The wheel modifies the wavelength of the light. Use horizontal movements: spinning the wheel to the left decreases the wavelength; spinning the wheel to the right increases the wavelength."

2.5 The Activities Menu

The Activities Menu is in the upper left-hand corner of the screen. It lists the five activities available in WebTOP: Module, Controls, Theory, Examples, and Exercises. We are currently in the Modules activity. The other activities will be discussed in Sec. 8.

3. The Fresnel Single Slit Module

Let's now use the Fresnel Single Slit Module to do some physics. This module simulates a monochromatic plane wave of light normally incident upon a single slit aperture. The observed intensity pattern is displayed on the observation screen, and is plotted (see the white curve) above the observation screen. The user can vary the following parameters: (a) the wavelength of the light, (b) the width of the slit, and (c) the distance, call it z, from the plane containing the slit to the observation plane.

Let's do an exercise with this module

Exercise 3.1 Changing the Width of the Slit: Odd Fresnel Numbers

Use the Wavelength box on the Console to set the wavelength equal to 500 nm, and the z box to set the distance to the screen to be 50 mm. Remember to hit the Enter key each time you type in a parameter value.

(a) Use the Width widget to make the width of the slit such that the Fresnel number is 7.0. Is the intensity on axis a maximum or a minimum? Starting at one edge of the intensity pattern and proceeding across it through the origin to the other edge, how many "major" maxima do you encounter?

What you should see is

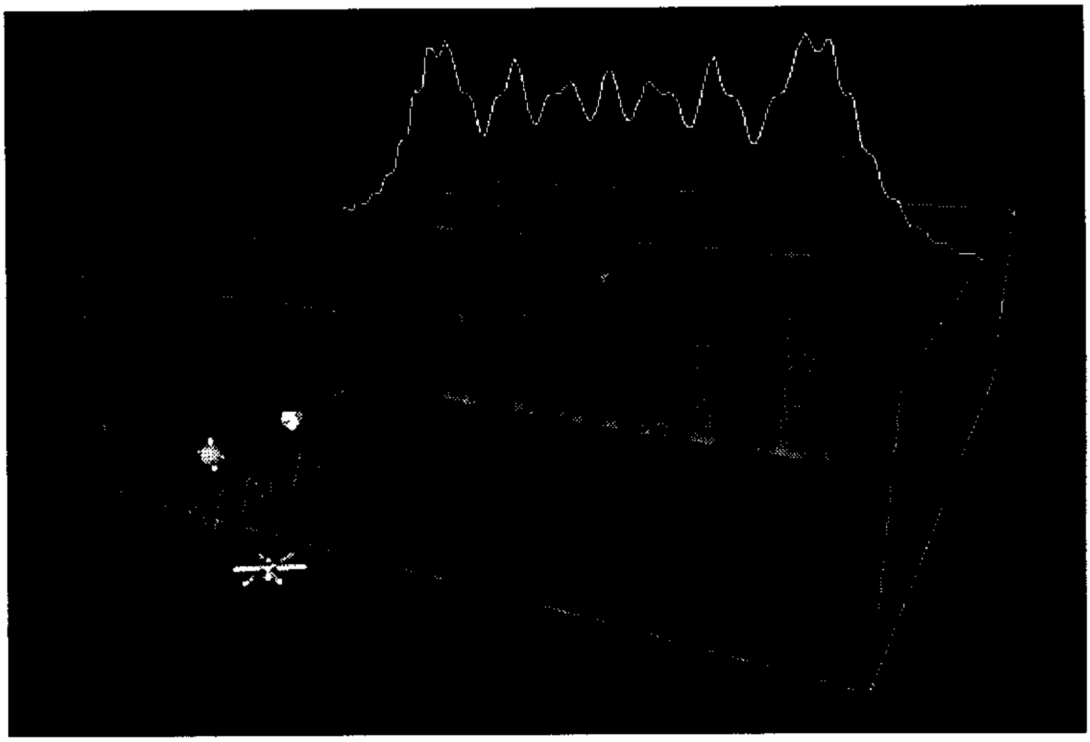

Figure 4 Fresnel diffraction from a single slit. Fresnel number of 7.0.

The intensity in the center is a maximum, and there are seven major maxima across the pattern.

(b) Use the Width widget to make the width of the slit such that the Fresnel number is 5.0. Is the intensity on axis a maximum or a minimum? Starting at one edge of the intensity pattern and proceeding across it through the origin to the other edge, how many “major” maxima do you encounter?

What you should see is shown on the next page.

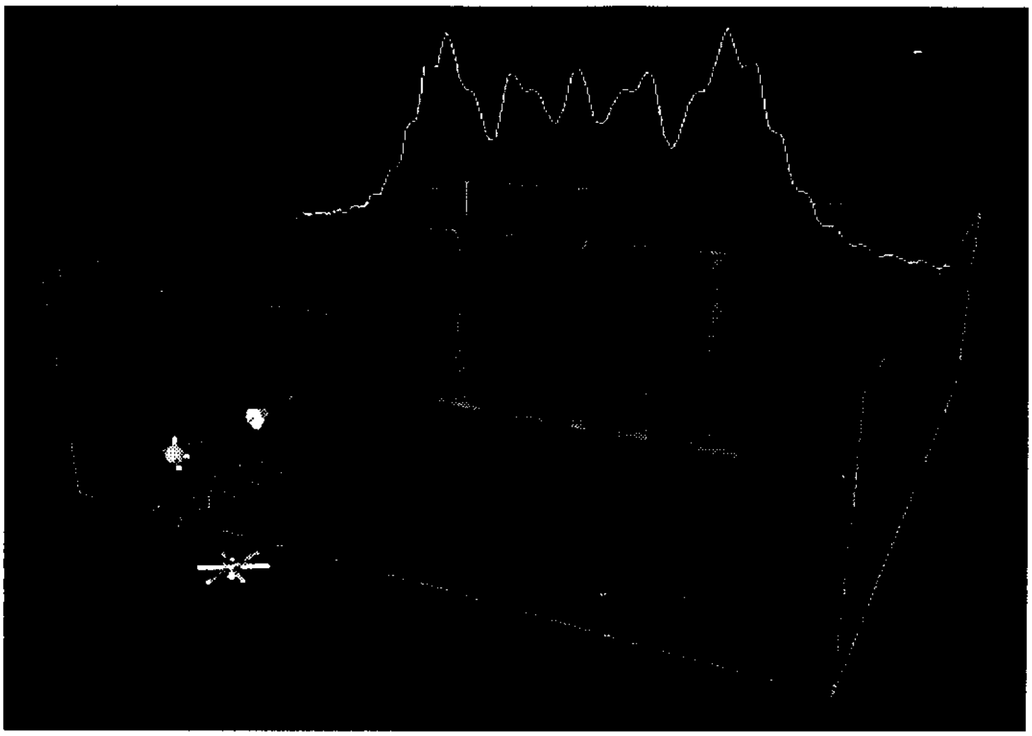

Figure 5 Fresnel diffraction from a single slit. Fresnel number of 5.0.

The intensity in the center is a maximum, and there are five major maxima across the pattern.

(c) Use the Width widget to decrease the width of the slit until the Fresnel number is 3.0. Is the intensity on axis a maximum or a minimum? Starting at one edge of the intensity pattern and proceeding across it through the origin to the other edge, how many "major" maxima do you encounter?

What you should see is shown in Figure 6 on the next page.

The intensity in the center is a maximum, and there are three major maxima across the pattern.

(d) What rule of thumb can be deduced from the results seen in (a) through (c) above, as regards the intensity on axis when the Fresnel number is odd?

When the Fresnel number is an odd integer, a maximum occurs on-axis.

(e) What rule of thumb can be deduced from the results seen in (a) through (c) above, as regards the number of major maxima seen across the intensity pattern when the Fresnel number is odd?

When the Fresnel number is an odd integer, the number of major maxima across the pattern is equal to the Fresnel number.

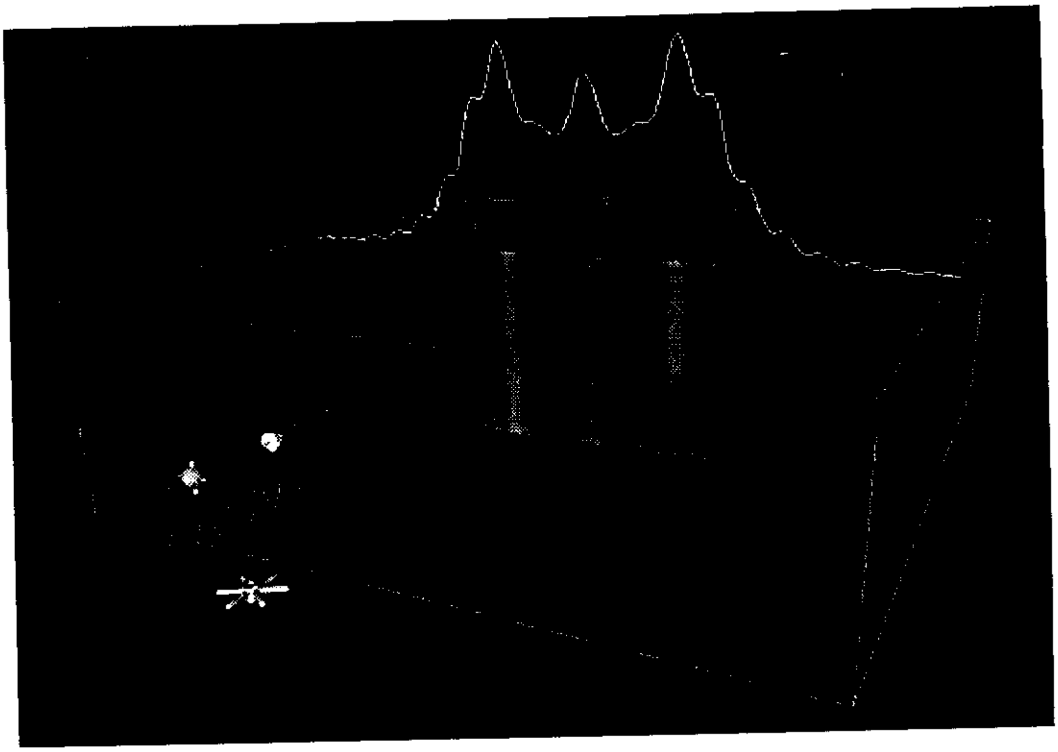

Figure 6 Fresnel diffraction from a single slit. Fresnel number of 3.0.

4. The Fresnel Circular Aperture Module

The Fresnel Single Slit module is pictured in Figure 7. In this module a monochromatic plane wave of wavelength λ is normally incident upon a circular aperture of diameter D. The resulting diffraction pattern is observed on an observation screen which is a distance z from the aperture plane.

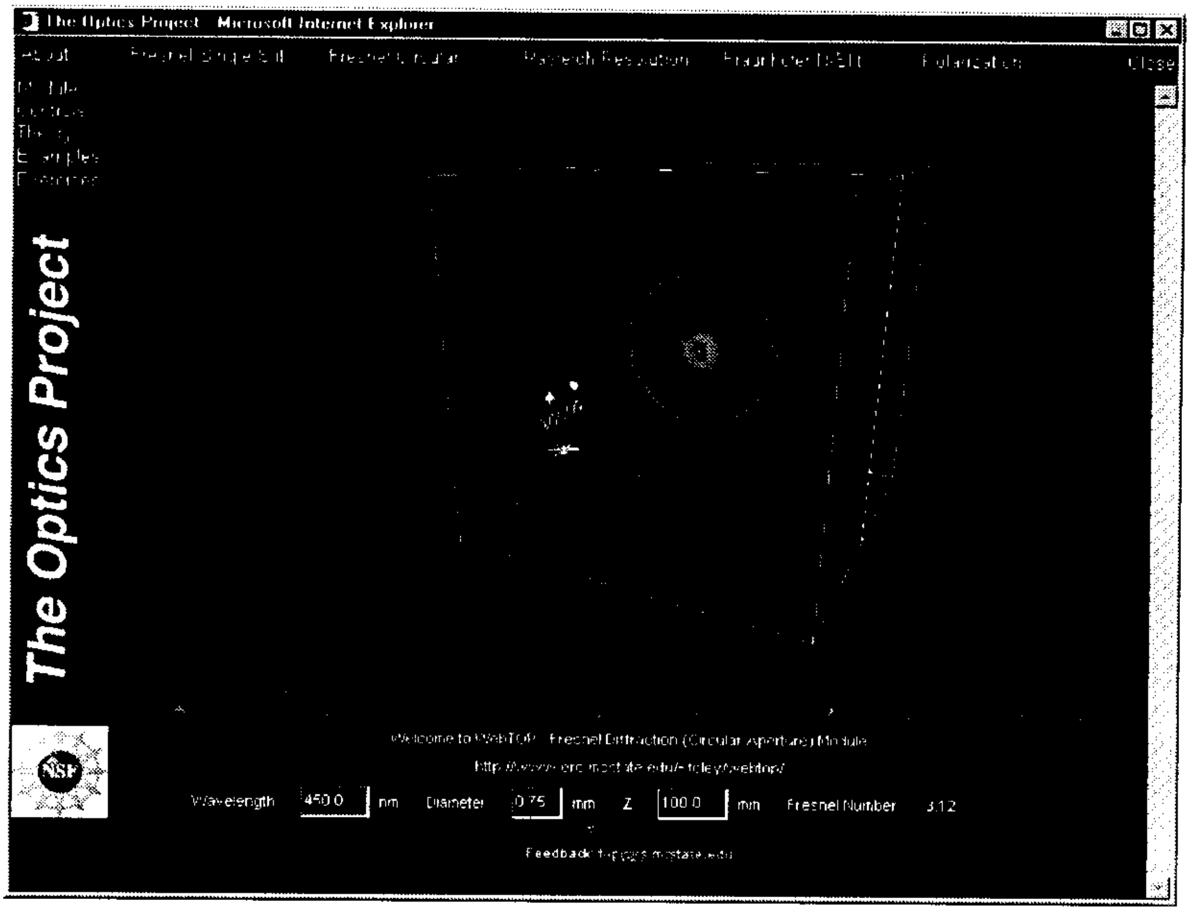

Figure 7 The Fresnel Circular Aperture module.

The parameters λ, D, and z can be changed either by typing the desired values into the appropriate keyboard entry box on the Console, or by manipulating the appropriate widget in the Scene. Spinning the Wavelength widget (the wheel which is located in front of the aperture) changes the wavelength. Pulling on the Diameter widget (the red double cone on the top of the aperture plane) changes the diameter of the aperture. Pulling on the Screen widget (the red double cone on the top of the observation screen) changes z.

The current value of the Fresnel number, which is defined as

$$N_F = \frac{D^2}{4\lambda z} , \qquad (4.1)$$

is displayed on the Console (see Fig. 7).

One comment is in order regarding Fig. 7. Upon comparing it to Fig. 1, it is clear that the CosmoPlayer dashboard has been "closed." This was done to maximize the area occupied by the Scene. If you would like to close the Dashboard, click on the small triangle in the top left-hand corner of the Console.

When the Dashboard is closed, the CosmoPlayer controls can be used via your mouse and keyboard. For a two button mouse the CosmoPlayer controls are:

Rotate	left mouse button
Zoom	shift + left mouse button
Pan	right mouse button
Undo/Redo	backspace
Home/Other Viewpoint	page up/page down.

For a three button mouse the commands are the same, except that Zoom is done with the middle mouse button.

Let us now try some exercises.

<u>Exercise 4.1 Changing z: Even Fresnel Numbers</u>

Use the keyboard entry boxes on the Console to enter the following parameter values: Wavelength = 500 nm and Diameter = 1.00 mm

(a) Use the Screen widget on the top of the observation screen to make the *z* such that the Fresnel number is 4.0. Is the intensity on axis a maximum or a minimum? Starting at one edge of the intensity pattern and proceeding across it through the origin to the other edge, how many "major" maxima do you encounter?

(b) Use the Screen widget on the top of the observation screen to make the *z* such that the Fresnel number is 6.0. Is the intensity on axis a maximum or a minimum? Starting at one edge of the intensity pattern and proceeding across it through the origin to the other edge, how many "major" maxima do you encounter?

(c) Use the Screen widget on the top of the observation screen to make the *z* such that the Fresnel number is 8.0. Is the intensity on axis a maximum or a minimum? Starting at one edge of the intensity pattern and proceeding across it through the origin to the other edge, how many "major" maxima do you encounter?. Is the intensity on axis a maximum or a minimum? Starting at one edge of the intensity pattern and proceeding across it through the origin to the other edge, how many "major" maxima do you encounter?

(d) What rule of thumb can be deduced from the results seen in (a) through (d) above as regards the intensity on axis when the Fresnel number is even? Use the module to test your rule for one more even Fresnel number.

(e) What rule of thumb can be deduced from the results seen in (a) through (d) above as regards the number of major maxima seen across the intensity pattern when the Fresnel number is even? Use the module to test your rule for one more even Fresnel number.

Exercise 4.2 Changing z: Odd Fresnel Numbers

Use the keyboard entry boxes on the Console to enter the following parameter values:
Wavelength = 500 nm and Diameter = 1.00 mm

(a) Use the Screen widget on the top of the observation screen to make the *z* such that the Fresnel number is 9.0. Is the intensity on axis a maximum or a minimum? Starting at one edge of the intensity pattern and proceeding across it through the origin to the other edge, how many "major" maxima do you encounter?

(b) Use the Screen widget on the top of the observation screen to make the *z* such that the Fresnel number is 7.0. Is the intensity on axis a maximum or a minimum? Starting at one edge of the intensity pattern and proceeding across it through the origin to the other edge, how many "major" maxima do you encounter?

(c) Use the Screen widget on the top of the observation screen to make the *z* such that the Fresnel number is 5.0. Is the intensity on axis a maximum or a minimum? Starting at one edge of the intensity pattern and proceeding across it through the origin to the other edge, how many "major" maxima do you encounter?. Is the intensity on axis a maximum or a minimum? Starting at one edge of the intensity pattern and proceeding across it through the origin to the other edge, how many "major" maxima do you encounter?

(d) What rule of thumb can be deduced from the results seen in (a) through (d) above as regards the intensity on axis when the Fresnel number is even? Use the module to test your rule for one more even Fresnel number.

(e) What rule of thumb can be deduced from the results seen in (a) through (d) above as regards the number of major maxima seen across the intensity pattern when the Fresnel number is even? Use the module to test your rule for one more even Fresnel number.

5. The Rayleigh Resolution Module

The Rayleigh Resolution module is pictured in Fig. 8. In this module monochromatic light of wavelength λ from two distant point sources separated by an angle θ is incident upon a lens of focal length *f* and diameter *D*. .The resulting intensity pattern is viewed on an observation screen positioned in the focal plane of the lens.

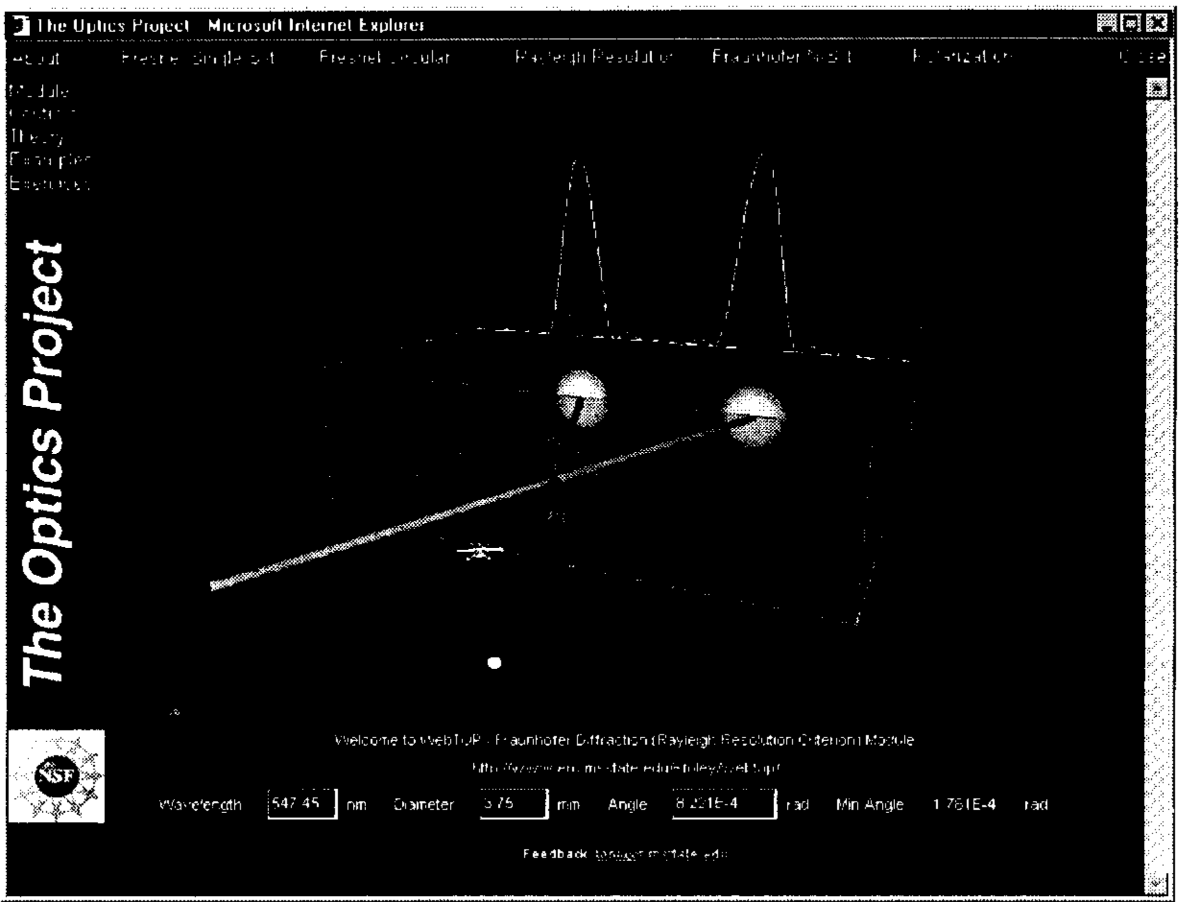

Figure 8 The Rayleigh Resolution module.

The parameters λ, *D*, and θ can be changed either by typing the desired parameter values into the appropriate keyboard entry box on the Console, or by using the appropriate widget in the Scene. (The focal length *f* can only be changed by using its widget.) Spinning Wavelength widget (the wheel which is located in front of the lens) changes the wavelength. Pulling on the Diameter widget (the red double cone on rim of the lens) changes the diameter of the lens. Pulling on the Angle widget (either of the two gray bars through the center of the lens) changes the angle between the sources. Pulling on the Focal Length widget (the red double cone on the top of the observation screen) changes the focal length of the lens.

The white line above the observation screen is a plot of the intensity of the light at observation points across the center of the screen.

The Console displays, in addition to the values of λ, D, and θ , the value of the minimum angle for which (according to Rayleigh) the two images can be resolved,

$$\theta_{\min} = \frac{1.22\lambda}{D} . \tag{5.1}$$

Exercise 5.1 The Resolution of Two Distant Sources: Changing Angular Separation of the Sources

(a) Use the keyboard entry boxes on the Console to enter the following parameter values: Wavelength =550 nm, Diameter = 3.355 mm, and Angle = 4.0E-4 rad. The minimum angle predicted by Rayleigh is 2.0E-4. Are the images resolved?

(b) Use the Angle keyboard entry box to change the angle between the two sources to 2.0E-4. Are the mages resolved?

(c) Use the Angle keyboard entry box to change the angle between the two sources to 1.0E-4. Are the mages resolved?

Exercise 5.2 The Resolution of Two Distant Sources: Changing the Wavelength of the Light

Start with the parameter values the same as they were in part (b) of the Exercise 5.1 (Wavelength = 550 nm, Diameter = 3.355 mm, and Angle 2.0E-4).

(a) Change the wavelength to 800 nm. Are the two sources resolved now?
(b) Change the wavelength to 400 nm . Are the two sources resolved now?

Exercise 5.3 The Resolution of Two Distant Sources: Changing the Diameter of the lens

Start with the parameter values the same as they were in part (b) of the Exercise 5.1 (Wavelength = 550 nm, Diameter = 3.355 mm, and Angle 2.0E-4).

(a) Change the diameter to 2 mm. Are the two images resolved now?

(b) Change the diameter back to 6 mm. Are the two images resolved now?

Exercise 5.4 The Resolution of Two Distant Sources: Changing the Focal Length of the Lens

Start with the parameter values the same as they were in part (b) of the Exercise 5.1 (Wavelength = 550 nm, Diameter = 3.355 mm, and Angle 2.0E-4).

(a) Use the Focal Length widget to increase the focal length of the lens. Are the two images resolved now?

(b) Use the Focal Length widget to decrease the focal length of the lens until it is smaller than it was when you started this exercise. Are the two images resolved now?

(c) Does the focal length matter at all as concerns resolution?

6. The Fraunhofer N-Slit Module

The Fraunhofer N-Slit module is pictured in Fig. 10. In this module monochromatic light of wavelength λ is normally incident upon a plane that contains N slits of width w and center-to-center separation d. The resulting intensity pattern is viewed on an observation screen which is a distance z from the aperture plane.

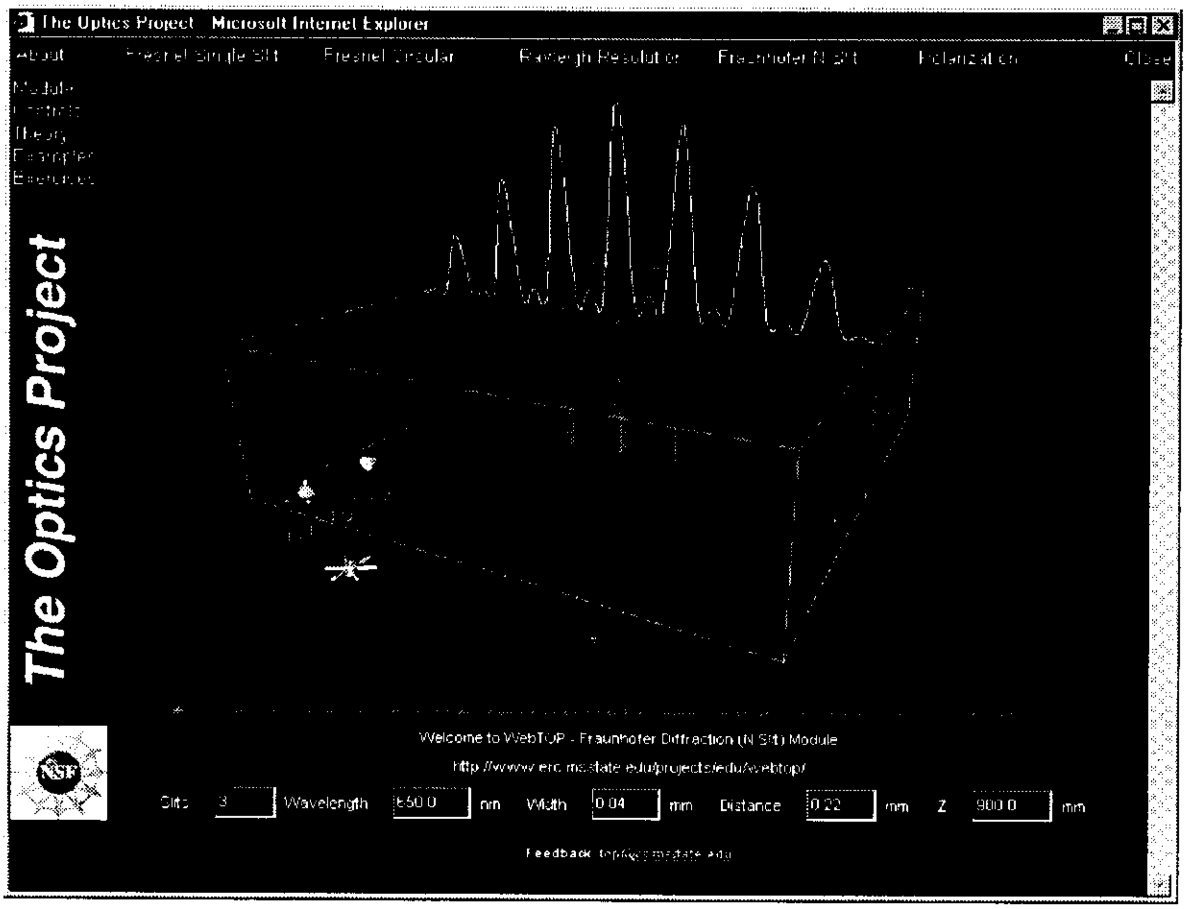

Figure 9 The Fraunhofer N-Slit module.

The parameter N can be changed by typing in the desired value into the Slits keyboard entry box on the Console. The parameters λ, w, d, and z can be changed either by typing the desired parameter values into the appropriate keyboard entry box on the Console, or by using the appropriate widget in the Scene. Spinning the Wavelength widget (the wheel which is located in front of the aperture plane) changes the wavelength. Pulling on the Width widget (the red double cone on the side of one of the slits) changes the slit width. Pulling on the Distance widget (the blue cone on the top of a slit) changes the separation of the slits. Pulling on the Screen widget (the red double cone on the top of the observation screen) changes z.

Exercise 6.1 Fraunhofer diffraction from a single slit.

Use the keyboard entry boxes on the Console to enter the following parameter values: Slits = 1, Wavelength = 600 nm, Width = 0.1 mm, z = 900 mm. (Distance is irrelevant if there is only one slit)

(a) Use the Width widget to increase the slit width. Does the diffraction pattern on the observation screen get narrower or wider?

(b) Use the Width keyboard entry box on the Console to return the slit width value to 0.1. Use the Wheel widget to increase the wavelength. Does the diffraction pattern on the observation screen get narrower or wider?

(c) Use the Wavelength keyboard entry box on the Console to return the wavelength to 600 nm. Use the z keyboard entry box to set the z value to 1400 mm.Use z widget to decrease z. Does the diffraction pattern on the observation screen get narrower or wider?

Exercise 6.2 Fraunhofer diffraction from two slits.

Use the keyboard entry boxes on the Console to enter the following parameter values: Slits = 2, Wavelength = 600 nm, Width = 0.005 mm, Distance = 0.2 mm, and z = 900 mm.

(a) Use the Width widget to increase the slit width. What happens to the intensity pattern on the observation screen?

(b) Use the Width keyboard entry box on the Console to return the slit width value to 0.005 mm. Use the Distance widget to increase the distance between the slits. What happens to the intensity pattern on the observation screen?

(c) Use the Distance keyboard entry box on the Console to return the distance value to 0.2 mm. Use the Wavelength widget to increase the wavelength. What happens to the intensity pattern on the observation screen?

(e) Use the Wavelength keyboard entry box on the Console to return the wavelength to 600 nm. Use the z keyboard entry box to set the z value to 1400 mm. Use the z widget to decrease z. What happens to the intensity pattern on the observation screen?

Exercise 6.3 Fraunhofer diffraction from more than two slits.

Use the keyboard entry boxes on the Console to enter the following parameter values: Slits = 2, Wavelength = 600 nm, Width = 0.005 mm, Distance = 0.1, and z = 900 mm.

(a) Use the Number keyboard entry box to change the number of slits to 3. What happens to the intensity pattern on the observation screen?

(b) Use the Number keyboard entry box to change the number of slits to 4. What happens to the intensity pattern on the observation screen?

(c) Use the Number keyboard entry box to change the number of slits to 10. What happens to the intensity pattern on the observation screen?

7. The Polarization module

The Polarization module is pictured in Figure 10. In this module the propagation of a monochromatic completely polarized plane wave of light (or an unpolarized plane wave of light) and the effect of various optical elements (polarizers and wave plates) on the corresponding electric field vector are simulated.

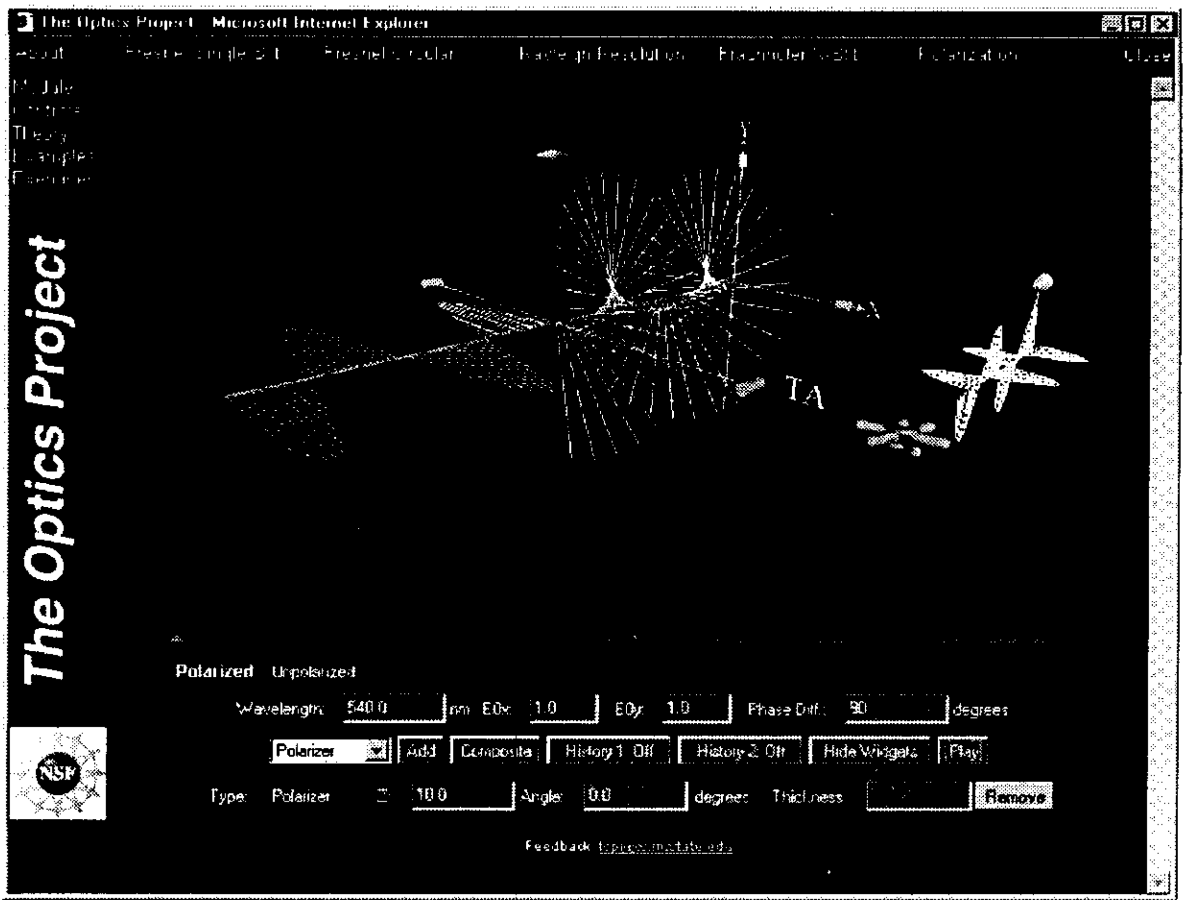

Figure 10 The Polarization module.

First the user chooses the incident field to be either completely polarized or unpolarized. If the former is chosen, the electric field simulated is of the form

$$\mathbf{E}(z,t) = E_{0x}\cos(kz - \omega t)\hat{x} + E_{0y}\cos(kz - \omega t + \varepsilon)\hat{y} \qquad (7.1)$$

where $\hat{x}$ and $\hat{y}$ are, respectively, unit vectors in the positive x and positive y directions, $k = 2\pi/\lambda$, and λ is the wavelength of the light. The parameters E_{0x}, E_{0y}, ε, and λ can be changed either by typing the desired parameter values into the appropriate keyboard entry box on the Console, or by using the appropriate widget in the Scene. Pulling on the E0x widget (the yellow collar on the x-axis) changes E_{0x}. Pulling on the E0y widget (the yellow collar on the y-axis) changes E_{0y}. Pulling on the Phase Difference widget (the blue cone over the orthogonal yellow waves just to the right of the x-axis) changes ε, the phase difference between the two components. Spinning the Wavelength widget (the wheel which is located just in front of the Phase Difference widget) changes the wavelength λ.

Once the incident field has been chosen two different kinds of filters, linear polarizers and wave plates, may be inserted into the path of the incident field. These are inserted by choosing the desired filter from the pull-down menu on the left-hand side of the Console and then hitting the Add button right next to the menu. To change the parameters of a filter, the filter must be "selected." When a filter is added it is automatically selected, so that its parameters can be modified. If a filter added previously is not selected and needs to be, it may be selected by putting the cursor over it.

For a linear polarizer there are two parameters that can be varied: its position, z, and the angle, ϕ that is its transmission axis (TA) makes with the positive x-axis. These two parameters can be changed either by typing the desired parameter values into the appropriate keyboard entry box on the Console, or by using the appropriate widget in the Scene. Pulling on the Position widget (the gray double cone on the top of the linear polarizer) changes z. Grabbing the Angle widget (the small gray cylinder on the end of the TA) and rotating it changes ϕ.

For a wave plate there are three parameters that can be varied: its position z, the angle ϕ that its fast axis makes with the positive x-axis, and its thickness, d (in units of the incident wavelength). These three parameters can be changed either by typing the desired parameter values into the appropriate keyboard entry box on the Console, or by using the appropriate widget in the Scene. Pulling on the Position widget (the gray double cone on the top of the wave plate) changes z. Grabbing the Angle widget (the small gray cylinder on the end of the fast axis) and rotating it changes ϕ. Pulling on the Thickness widget (the two gray boxes near the upper right-habd corner of the wave plate) changes d.

Warning: You must hit the Stop button to stop the animation before exiting the Polarization module. If you do not, it WebTOP will stop responding and hang up your computer.

Exercise 7.1 Polarized and unpolarized light

(a) Use the keyboard entry boxes on the Console to enter the following parameter values (which are the default values): E_{0x} = 1.0, E_{0y} = 1.0, and Phase difference = 90.0. Click on the History 1 button on the Console. What kind of polarized light is this? Linear? Right circular? Left Circular? Elliptical?

(b) Use the E0x keyboard entry box to change the value of the x-component of the field to 0.5. What kind of polarized light is this? Linear? Right circular? Left Circular? Elliptical?

(c) Use the Phase Difference keyboard entry box to change the value of the phase difference between the x and y components to be 0. What kind of polarized light is this? Linear? Right circular? Left Circular? Elliptical?

(d) Click on the Unpolarized tab in the console.

Exercise 7.2 Linear polarizer.

If the Unpolarized option is not active, click on the Unpolarized tab in the upper left hand corner of the Console.

(a) From the pull down menu on the left-hand side of the Console, choose Polarizer, and then click on the Add button. Use the Position widget to place the polarizer at, approximately the position $z = 5$. What is the polarization of the light exiting the polarizer?

(b) Add another polarizer and place it at the position $z = 15$. Use the Angle keyboard entry box to set the angle that the TA makes with the x-axis to be 90 degrees. What is the intensity of the light exiting this second polarizer?

(c) Add another polarizer and position it at $z = 10$. Use the Angle keyboard entry box to set the angle that the TA makes with the x-axis to be 45 degrees. What is the polarization of the light exiting this third polarizer?

Exercise 7.3 Half-Wave plate.

If the Polarized option is not active, click on the Polarized tab in the upper left hand corner of the Console.

Use the keyboard entry boxes on the Console to enter the following parameter values: $E_{0x} = 1.0$, $E_{0y} = 1.0$, and Phase Diff = 0. From the pull-down menu on the left-hand side of the Console, choose Waveplate, and then click on the Add button. Use the Position widget for this wave plate to place it at the position $z = 10$. The Thickness parameter should be 0.50.

The light entering the wave plate is linearly polarized at 45 degrees from the positive $x =$ axis. What is the polarization of the light exiting the wave plate?

Exercise 7.4 Quarter-Wave plate.

Use the Angle keyboard entry box to change the angle that the fast axis makes with the x-axis to zero. Use the Thickness keyboard entry box to change the thickness to 0.25. What is the polarization of the light exiting the wave plate?

8. Other WebTOP Activities

There are five activities available in WebTOP: Module, Controls, Theory, Examples, and Exercises.

The Module activity is just the simulation itself, which we have discussed already.

The Controls activity contains documentation on how to interact with a WebTOP module: (a) how to change the parameters by using the widgets in the Scene or the keyboard entry boxes on the Console, and (b) how to use the CosmoPlayer browser.

When the user clicks on Theory in the activities menu, she is linked to an HTML document which contains the theory relevant to the current module. These are the relevant sections of lecture notes of the junior/senior undergraduate optics course taught at Mississippi State University. For example, in the Fresnel Diffraction, Circular Aperture submodule the theory section has sections on the relevant diffraction integral, the on-axis intensity and the Fresnel number, Fresnel zones, and the full intensity pattern. It is suggested that the user read this material before interacting with the module, but this is not mandatory.

The Examples activity for each module is not ready yet. Upon completion this activity will linked to an HTML page that offers the opportunity to view any of several previously recorded WebTOP sessions. When the user clicks on one of the choices, the session is replayed in the Scene part of the window. These example sessions will be very helpful to a new user because it gives her a feel for what can be done with the module
When the user clicks on Exercises in the Activities module, she is linked to an HTML page with a list of exercises she can try. These are inquiry-based exercises in that the user is asked to interact with the software, observe how the simulation changes, and then come up with an explanation for what is happening.

10. Conclusion

WebTOP is not yet a finished product. We would appreciate any comments or suggestions you can give to us. Please send them by email to top@cs.msstate.edu.

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Appendix B: Installing WebTOP from a CD-ROM

We are assuming that you have the latest browser installed on your computer and that JavaScript and Java are enabled for your browser.
You have three options for running WebTOP. You can run it by accessing it in the World Wide Web. The URL you need to use is:

http://www.erc.msstate.edu/projects/edu/webtop/

Accessing it from the Web allows you to run the most updated version and provides you with access to the most recent modules.
The second and third options are to run it directly from the CD or from your computer hard drive. The hard drive option is the better option.

Running it from the CD-ROM:

Locate the WebTOP folder in the CD-ROM, open it and double click on the "index.html" document. The extension of the document might be hidden, and will appear as "index". The startup window will advise you whether the Cosmo-VRML browser is already installed. If it is not installed, we advise you to shut your browser and follow the instructions about installing the VRML browser as described below.

Running it from the Hard-Drive:

Locate the WebTOP folder in the CD-ROM, and then copy to your hard drive. The location you choose is not important. To run WebTOP, open the newly copied folder and double click on the "index.html" document. The extension of the document might be hidden, and will appear as "index". The startup window will advise you whether the Cosmo-VRML browser is already installed. If it is not installed, we advise to shut your browser and follow the instructions about installing the VRML browser as described below.

Installing the Cosmo-VRML Browser:

Even though WebTOP does not require an installation procedure, the Cosmo-VRML browser needs to be installed on your computer before you can view the modules. The software is designed to detect whether or not the VRML browser is already installed on your computer. If it is not, a message will pop up advising you to install it. The Windows version of the installation program of the Cosmo browser is available on the CD-ROM. Assuming that the drive letter for your CD-ROM is D, the path for the installation program of the Cosmo browser is:

D:\webtop\download\ cosmo_win95nt_eng.exe

Double click on the installation program and follow the instructions. After accepting the license agreement, the program lists the browsers that are installed on your computer. Irrelevant of what it says please select all what that are listed. It will then re-list the browsers. Please select them again. If one of your browsers is Netscape 4.5 or higher, the installation program will ask you to locate the plugins folder for Netscape. Usually, the folder is:

C:\Program Files\Netscape\Program\Plugins\

Browse until you locate your particular folder then press OK and complete the installation. Restart the computer before attempting to run WebTOP.