Two Point-Source Interference Simulator

This program simulates the interference pattern of two ideal source points using variable parameters.

Windows:

- Interference Pattern: The interference pattern created by the two sources using the user inputted parameters.
- User Controls: The controls for the parameters that the user may vary.
- 3-D View of Source Points: The physical orientation of the point sources in 3-D space. The screen that the light is being projected onto is along the z-axis.

Controls:

Alpha:

Alpha is the rotation of the sources about the z-axis. It is variable between 0 and π.

Beta:

Beta is the rotation of the sources about the x-axis. It is variable between 0 and π.

Gamma:

Gamma is the rotation of the sources about the new z-axis, after the beta angle shifts the vector normal to the xy plane. It is variable between 0 and π.

Lambda:

Lambda is the wavelength of light emitted by the sources. It is variable between 200nm and 10000nm.

Screen Size:

This is the length of each side of the screen. Which is variable between 1cm and 10cm, or 1cm^2 and 100cm^2.

Screen Distance:

This is how far the observation plane is from the sources. It is variable between 10cm and 50cm.

Separation:

This is the separation between the two sources. It is variable between 1μm and 1mm.

Common Errors:

- If there are too many fringes the pattern will start to pixelate and the pattern will be unreasonable. This is generally caused by there being too many fringes for the screens resolution. By reducing the source separation and/or by increasing the screen distance you can steer away from this.
- If any of the sliders are moved too rapidly the program will freeze. If you run into this problem you must force quit Matlab and re-open the program.
- If there are parts of the “User Controls” window cut off re-size the screen to where you are able to see all of the parameters.
- Units:
    - Angles Alpha, Beta, and Gamma must be inputted in radians between 0 and π when manually editing the values. These values may be entered in the form of “pi, pi/4, ect.” as long as the value remains between the accepted range.
    - All other parameters must be inputted in meters when manually editing the values.
- When a value is entered into a textbox outside the accepted range, the value will reset to the minimum.