

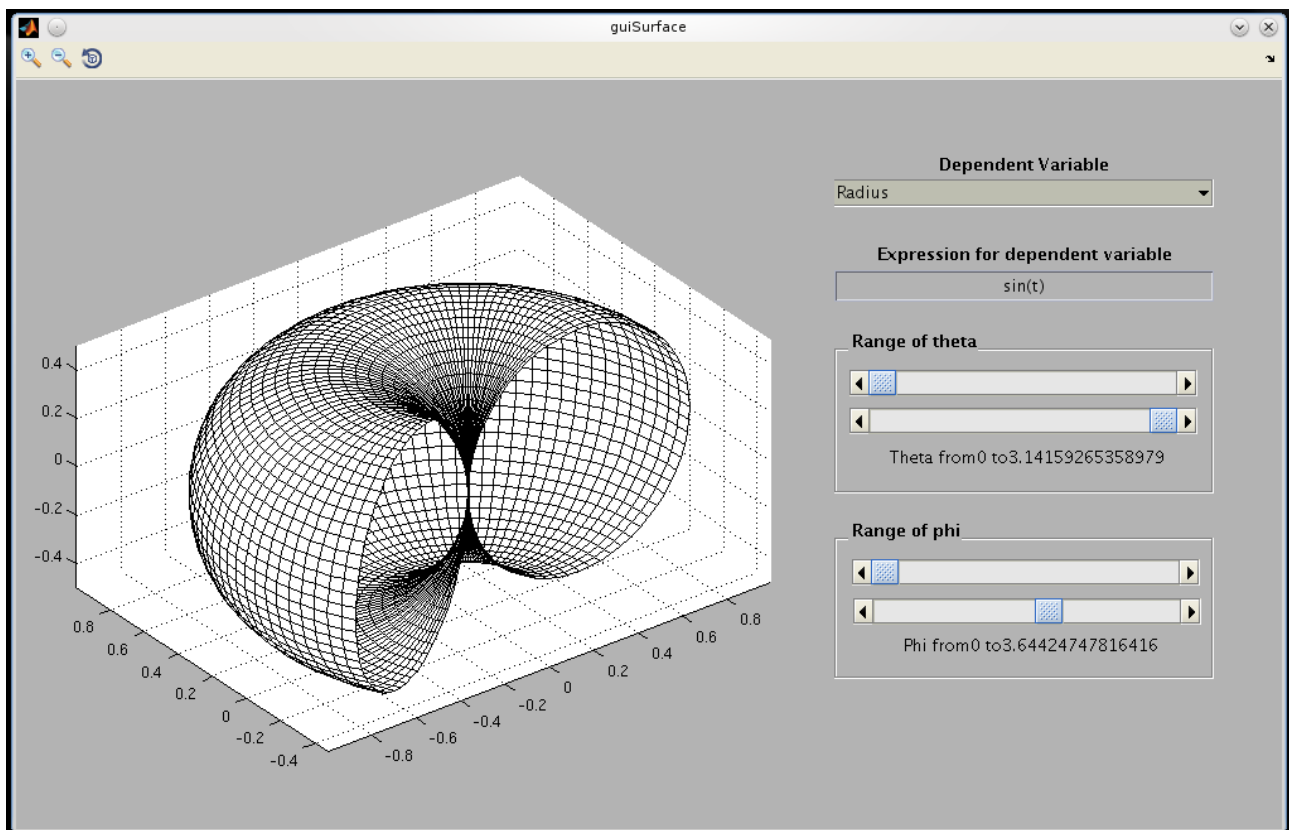
SPHERICAL COORDINATE SYSTEM APPLET

Problem Statement

To create an applet to plot surfaces in the spherical coordinate system

Features of the Applet

- Can directly input a spherical coordinate function from the user and plot it in 3D space
- The dependent variable can be changed.
- Independent variables can be varied over any given range.
- Cartesian axes are given to aid visualization
- Written in MATLAB™



Screenshot of $r=\sin\theta$

Why MATLAB™?

- Has an interface for GUI based coding
- Simplified coding
- Specialized for engineering applications
- Alternative to Java

REQUIREMENTS

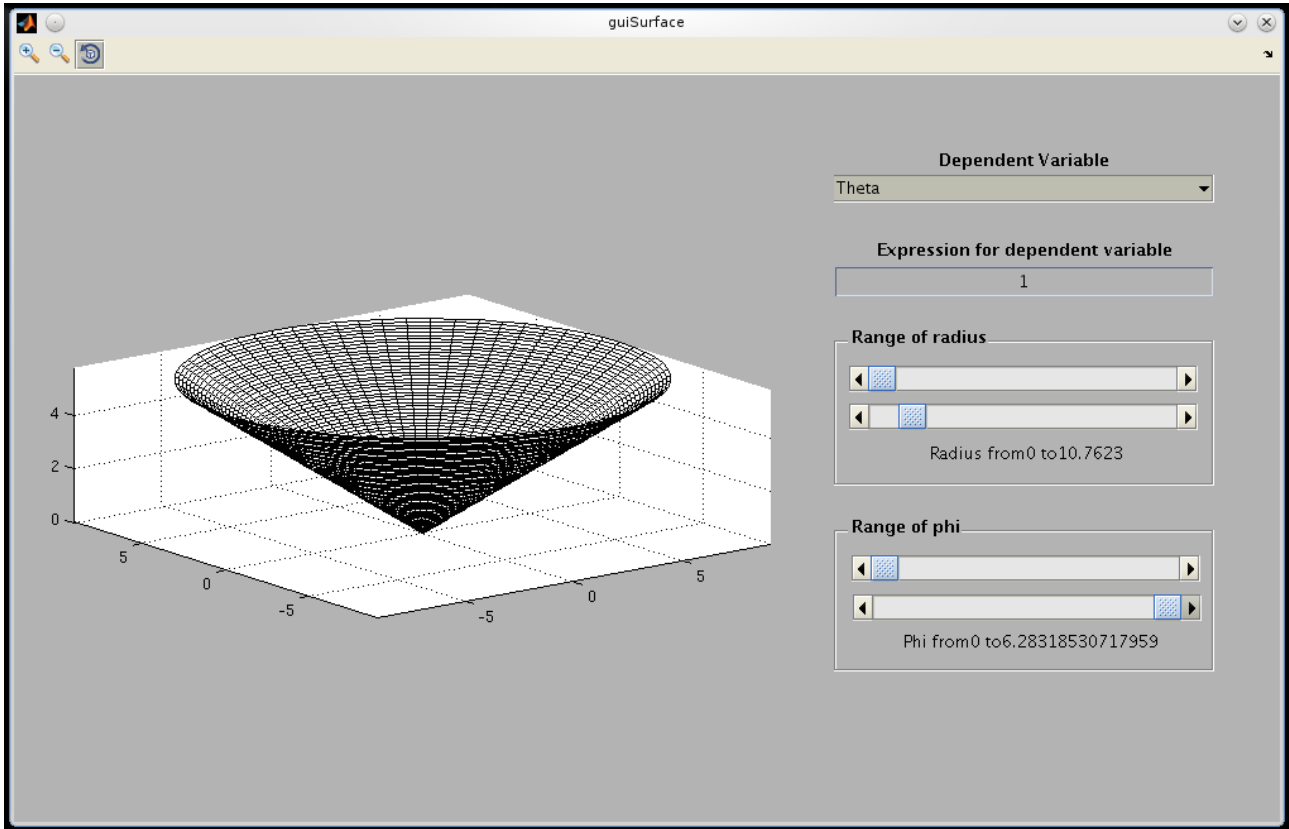
- Plots spherical coordinates, functions and surfaces
- To convert spherical to cartesian

IMPLEMENTATION

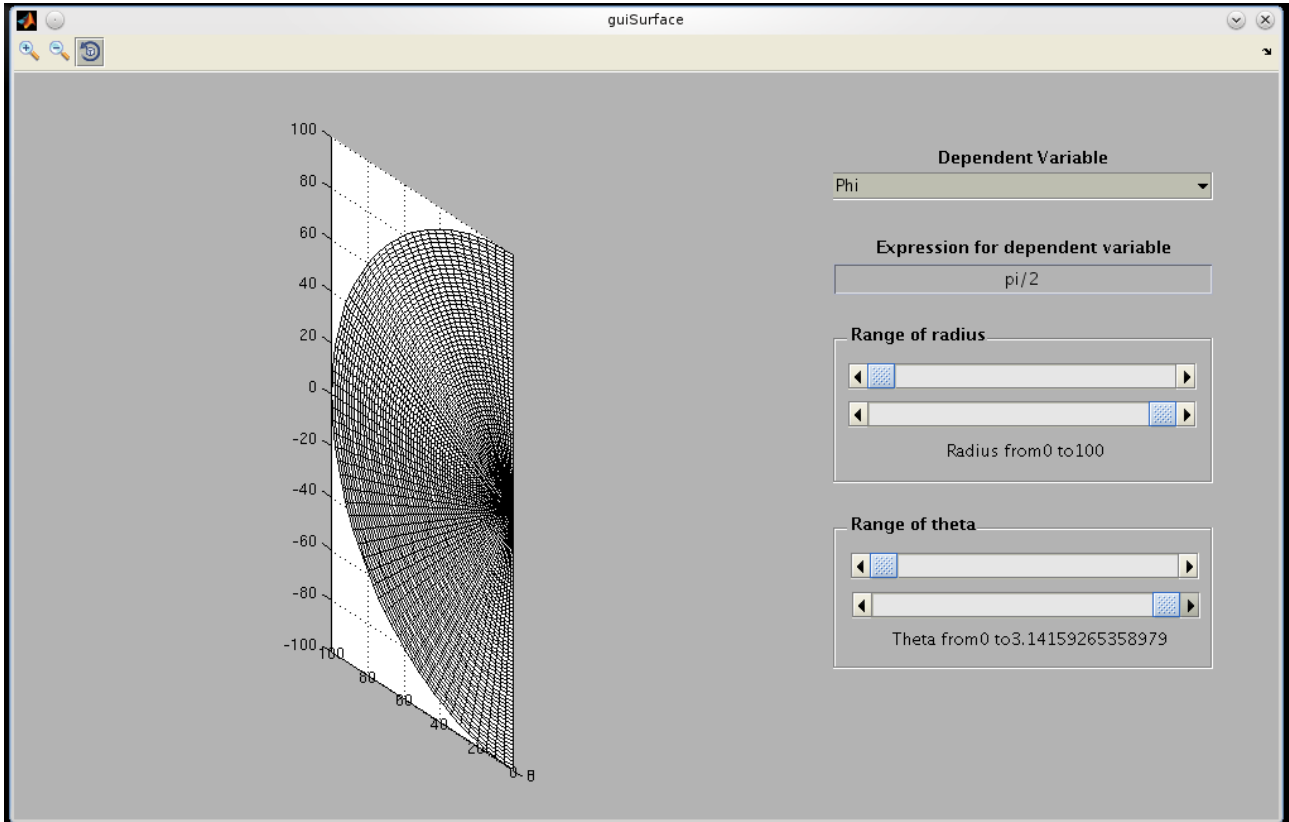
- Get an expression for the dependent variable from the user
- Generate a 2D array containing all possible combinations of the two independent variables
- Calculate the corresponding values of the dependent variable
- **Spherical coordinates cannot be directly plotted as such, since they are defined with reference to a cartesian coordinate system.**
- Convert the spherical coordinates to cartesian coordinates using suitable relations
- Plot the expression with reference to cartesian

Conversion Relations

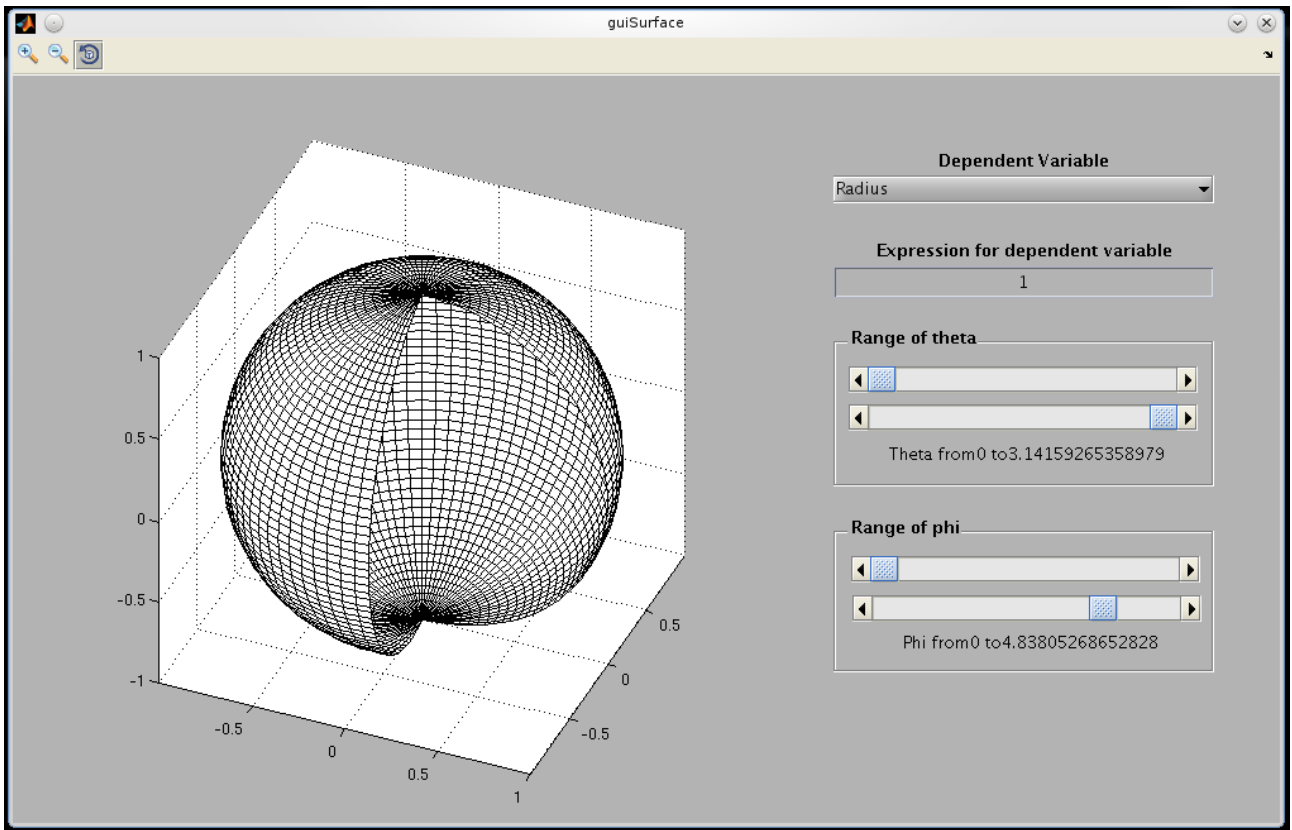
- $x=r\sin\theta\cos\phi$
- $y=r\sin\theta\sin\phi$
- $z=r\cos\theta$



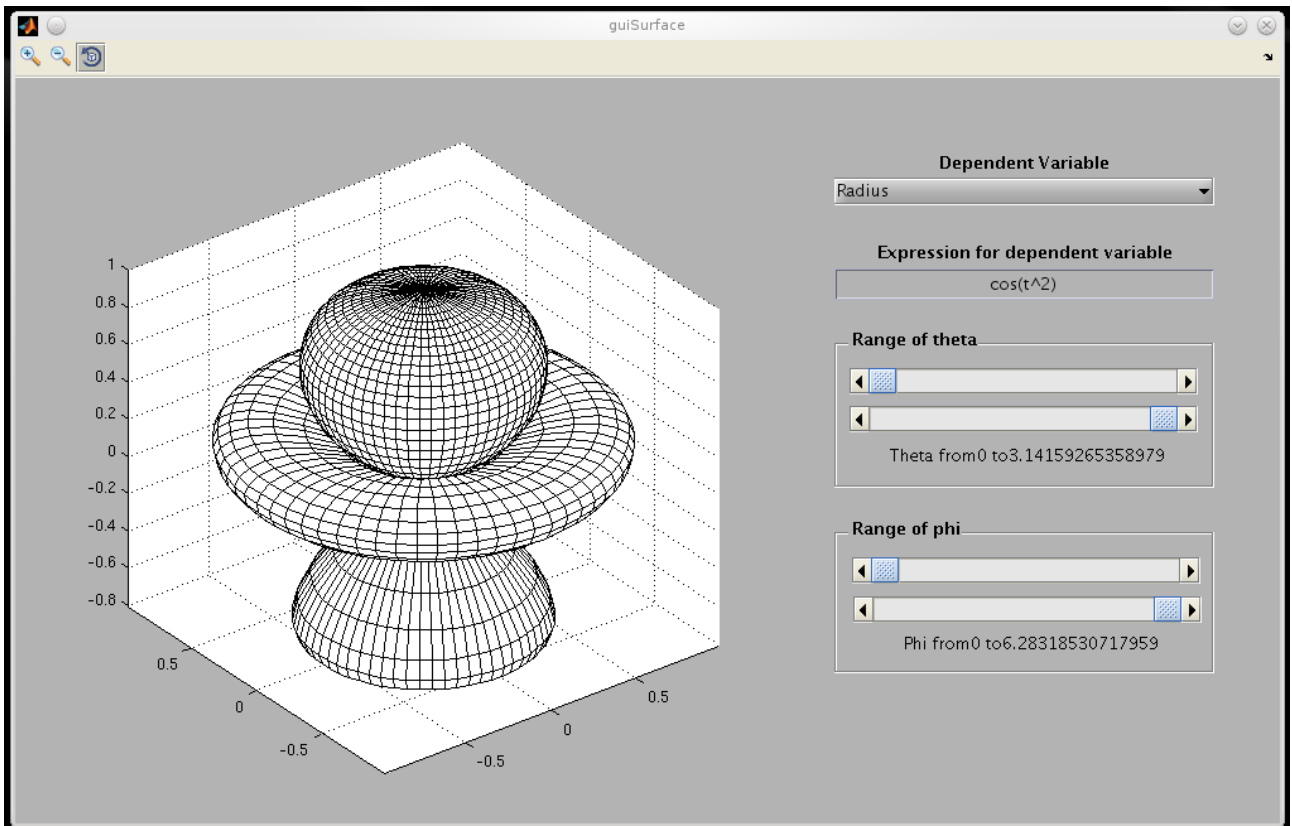
$$\theta=1$$



$$\phi=\pi/2$$



$$r=1$$



$$r=\cos(\theta^2)$$

Electromagnetic Fields

Assignment Submitted By

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