

Generate 3D Plot and Surfaces

Spoken Tutorial Project

<https://spoken-tutorial.org>

National Mission on Education through ICT

<http://sakshat.ac.in>

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Learning Objectives



Learning Objectives

- **Generate a 3D plot with splot command**



Learning Objectives

- ▶ **Generate a 3D plot with splot command**
- ▶ **Rotate to change the viewing angle**



Learning Objectives

- ▶ **Generate a 3D plot with splot command**
- ▶ **Rotate to change the viewing angle**
- ▶ **Change the surface properties**



Learning Objectives

- ▶ **Generate a 3D plot with splot command**
- ▶ **Rotate to change the viewing angle**
- ▶ **Change the surface properties**
- ▶ **Color the two sides of the surface differently**



Learning Objectives



Learning Objectives

- **Make a graph using script commands**



Learning Objectives

- ▶ **Make a graph using script commands**
- ▶ **Write, edit and execute a script**



Learning Objectives

- ▶ **Make a graph using script commands**
- ▶ **Write, edit and execute a script**
- ▶ **Draw a sphere**



Learning Objectives

- ▶ **Make a graph using script commands**
- ▶ **Write, edit and execute a script**
- ▶ **Draw a sphere**
- ▶ **Change the surface color of the sphere**



Learning Objectives

- ▶ **Make a graph using script commands**
- ▶ **Write, edit and execute a script**
- ▶ **Draw a sphere**
- ▶ **Change the surface color of the sphere**
- ▶ **Generate a heat map**



System Requirements



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► Ubuntu Linux 16.04



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- ▶ **Gedit v 3.18**



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- ▶ `gnuplot v 5.2.6`



Pre-requisites



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- ▶ **Learner must be familiar with basics of gnuplot**



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- ▶ **For prerequisite gnuplot tutorials please visit this site**
<https://spoken-tutorial.org>



Equation for a Sphere



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- Equation for a sphere with radius r , centered at $(0, 0, 0)$ is

$$x^2 + y^2 + z^2 = r^2$$



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- **This function can be plotted in parametric mode as,**

$$r \sin(u) \cos(v), r \sin(u) \sin(v), r \cos(u)$$



Summary

- ▶ **Generated a 3D surface with the `splot` command**
- ▶ **Changed the viewing angle**
- ▶ **Modified the 3D plot**
- ▶ **Colored the two surfaces of the plot differently**



Summary

- ▶ **Plotted a sphere and changed the color**
- ▶ **Wrote and modified a script**
- ▶ **Executed the script to generate a plot**
- ▶ **Learned to generate a heat map**



Assignment

- ▶ **Plot five spheres in a graph with different radius**
- ▶ **Center and color the spheres differently**



Assignment

Hint:

- For a sphere centered at (x_1, y_1, z_1) use the equation for sphere as seen here

$$x_1 + r \sin(u) \cos(v), y_1 + r \sin(u) \sin(v), \\ z_1 + r \cos(u)$$



About the Spoken Tutorial Project

- ▶ Watch the video available at https://spoken-tutorial.org/What_is_a_Spoken_Tutorial
- ▶ It summarises the Spoken Tutorial project
- ▶ If you do not have good bandwidth, you can download and watch it



Spoken Tutorial Workshops

The Spoken Tutorial Project Team

- ▶ Conducts workshops using spoken tutorials
- ▶ Gives certificates to those who pass an online test
- ▶ For more details, please write to contact@spoken-tutorial.org



Forum for Specific Questions

- ▶ Questions in **THIS Spoken Tutorial?**
- ▶ Visit <https://forums.spoken-tutorial.org>
- ▶ Choose the minute and second where you have the question
- ▶ Explain your question briefly
- ▶ The Spoken Tutorial project will ensure an answer

You will have to register to ask questions



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