

MATH 3341: Introduction to Scientific Computing Lab

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The background features a large, faint watermark of the University of Wyoming seal. The seal is circular with a rope-like border. Inside the border, the words "UNIVERSITY OF WYOMING" are written in an arc at the top, and "1886" is at the bottom. In the center, there is a smaller circle containing the word "EQUALITY" and a depiction of a book.

Lab 10: MATLAB 3D Plots



The background features a large, faint watermark of the University of Wyoming seal. The seal is circular with a rope-like border. Inside the border, the text "UNIVERSITY OF WYOMING" is at the top, "EQUALITY" is in the center, and "1886" is at the bottom. In the middle of the seal is an open book with a quill pen resting on it.

mesh and surf



meshgrid Cartesian grid in 2-D/3-D space

$[X,Y] = \text{meshgrid}(xgv,ygv)$ replicates the grid vectors xgv and ygv to produce the coordinates of a rectangular grid (X, Y) . The grid vector xgv is replicated $\text{numel}(ygv)$ times to form the columns of X . The grid vector ygv is replicated $\text{numel}(xgv)$ times to form the rows of Y .



mesh 3-D mesh surface.

- `mesh(X,Y,Z,C)` plots the colored parametric mesh defined by four matrix arguments. The view point is specified by `VIEW`. The axis labels are determined by the range of `X`, `Y` and `Z`, or by the current setting of `AXIS`. The color scaling is determined by the range of `C`, or by the current setting of `CAXIS`. The scaled color values are used as indices into the current `COLORMAP`.
- `mesh(X,Y,Z)` uses $C = Z$, so color is proportional to mesh height.
- `mesh(Z)` and `mesh(Z,C)` use $x = 1:n$ and $y = 1:m$. In this case, the height, `Z`, is a single-valued function, defined over a geometrically rectangular grid.



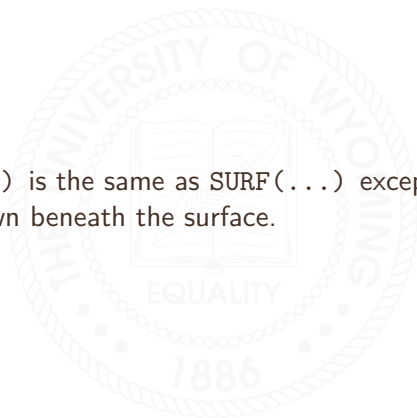
surf 3-D colored surface

- `surf(X,Y,Z,C)` plots the colored parametric surface defined by four matrix arguments. The view point is specified by `VIEW`. The axis labels are determined by the range of `X`, `Y` and `Z`, or by the current setting of `AXIS`. The color scaling is determined by the range of `C`, or by the current setting of `CAXIS`. The scaled color values are used as indices into the current `COLORMAP`. The shading model is set by `SHADING`.
- `surf(X,Y,Z)` uses $C = Z$, so color is proportional to surface height.
- `surf(Z)` and `surf(Z,C)` use $x = 1:n$ and $y = 1:m$. In this case, the height, `Z`, is a single-valued function, defined over a geometrically rectangular grid.



surf and surfc Combination surf/contour plot.

- `surfc(...)` is the same as `SURF(...)` except that a contour plot is drawn beneath the surface.



colormap Color look-up table

- `colormap(MAP)` sets the current figure's colormap to MAP.
- Built-in colormaps: `parula`, `jet`, `hsv`, `hot`, `cool`, `sprint`, `summer`, `autumn`, `winter`, `gray`, `bone`, `copper`, `pink`, `lines`, `colorcube`, `prism`, `flag`, `white`.

