

MATH 3341: Introduction to Scientific Computing Lab

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The background of the slide 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 at the top, "EQUALITY" is in the center, and "1886" is at the bottom. A book is depicted in the center of the seal.

Lab 10: MATLAB 3D Plots



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mesh and surf



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

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



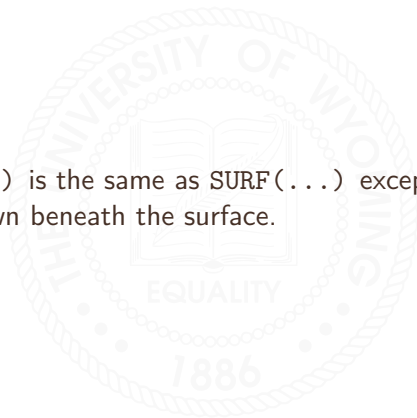
surf 3-D colored surface

- `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 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`.

