

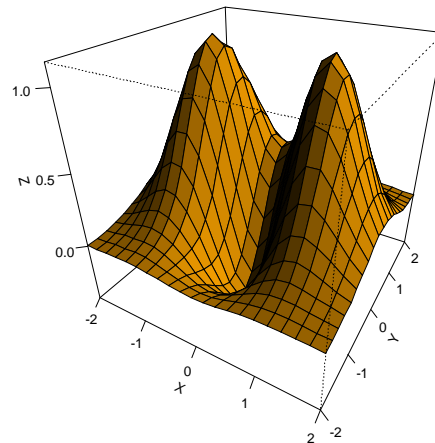
## Quiver Plots: Visualization of Vector Fields

### The Data Set

Vector fields play an important role in science and engineering. They are used to describe a wide variety of phenomena including fluid flow. To illustrate vector fields, let us consider a collection of  $x, y, z$  values that describe a surface net. The  $z$  value for each node is calculated from the function

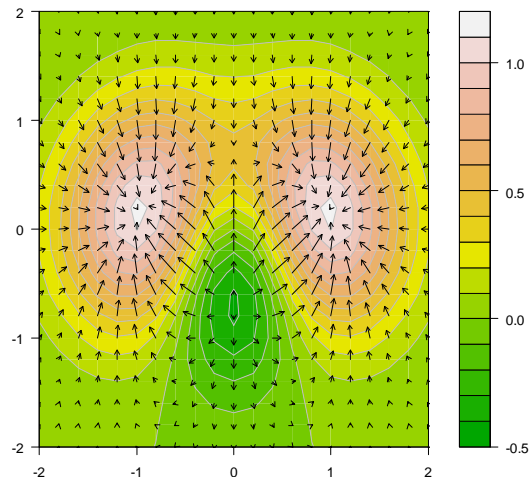
$$f(x, y) = (3x^2 + y) \times e^{-(x^2 + y^2)}$$

The net is displayed in three dimensions in the figure on the right. A vector field would correspond to the magnitude and direction of the slope of the net at each node.



### The Analysis

Large vector fields often exhibit quite complex structures, which can be difficult to reveal, making efficient visualization of a vector field an important analysis. A preferred 2-D visualization, illustrated on the right, corresponds to a "quiver" plot. You may recall that a quiver is a carrying case for arrows.



### The Interpretation

The analysis calculates a  $dx$  and  $dy$  component of the slope at each node in the net. It then uses this information to define a vector (an arrow) at each  $x, y$  position, whose length and orientation correspond to the magnitude and direction of the slope, respectively