Envelope for family of lines
\[
\cos \theta y + \sin \theta x = 1
\]
\[ u_t + uu_x = 0 \]
\[ u(x,0) = \begin{cases} 1 & x \geq 0 \\ -1 & x < 0 \end{cases} \]

This is a plot of the characteristics for the Burger's equation with the initial data 
\[ u_0(x) = \text{sgn}(x) \]. Note that for \( t < 0 \) the surface is not a single-valued function, while for \( t > 0 \) we see the fan connecting the two characteristic surfaces.