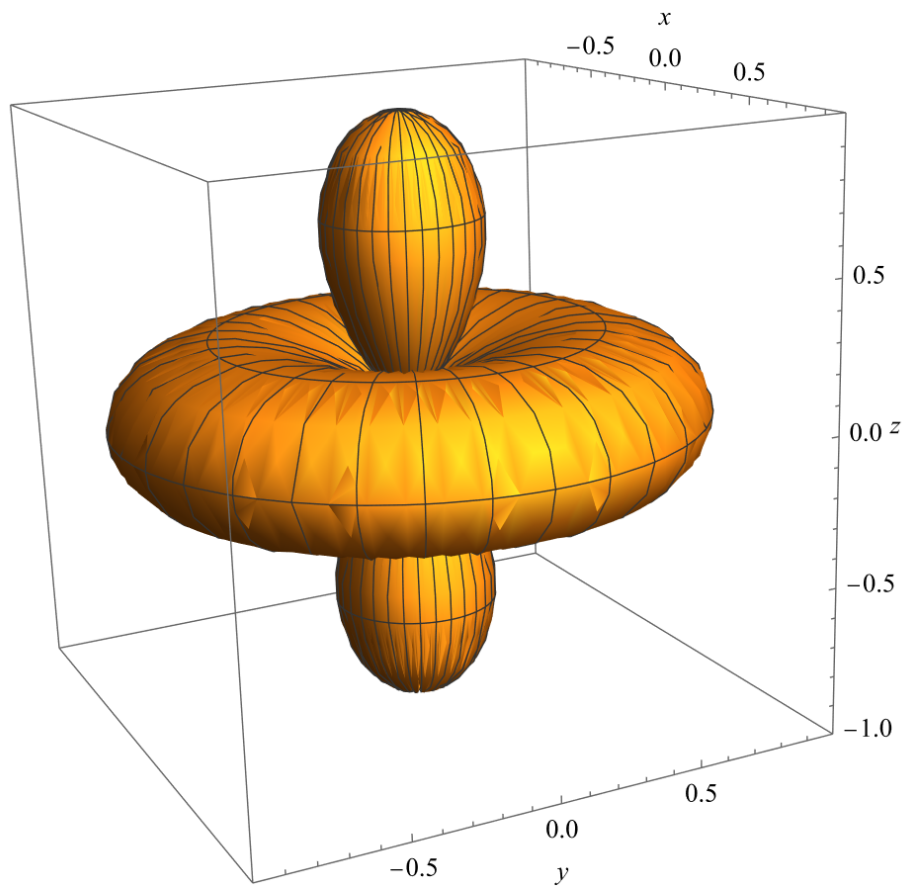


Exercise 21

Describe the surface given in spherical coordinates by $\rho = \cos 2\theta$.

Solution

Below is the graph of $\rho = \cos 2\theta$ for $0 \leq \theta \leq 2\pi$ and $0 \leq \phi \leq \pi$.



It's symmetric about the polar (z -) axis, and it looks like a doughnut that has a dumbbell going through it.

Compare this to the graph of $r = \cos 2\theta$ for $0 \leq \theta \leq 2\pi$ (polar coordinates).

