

3D ANIMATION: SNAIL-2-PLANE

A Mathcad 13 Worksheet by Roger L. Mansfield
Astronomical Data Service, 2010 June 5
<http://astroger.com>

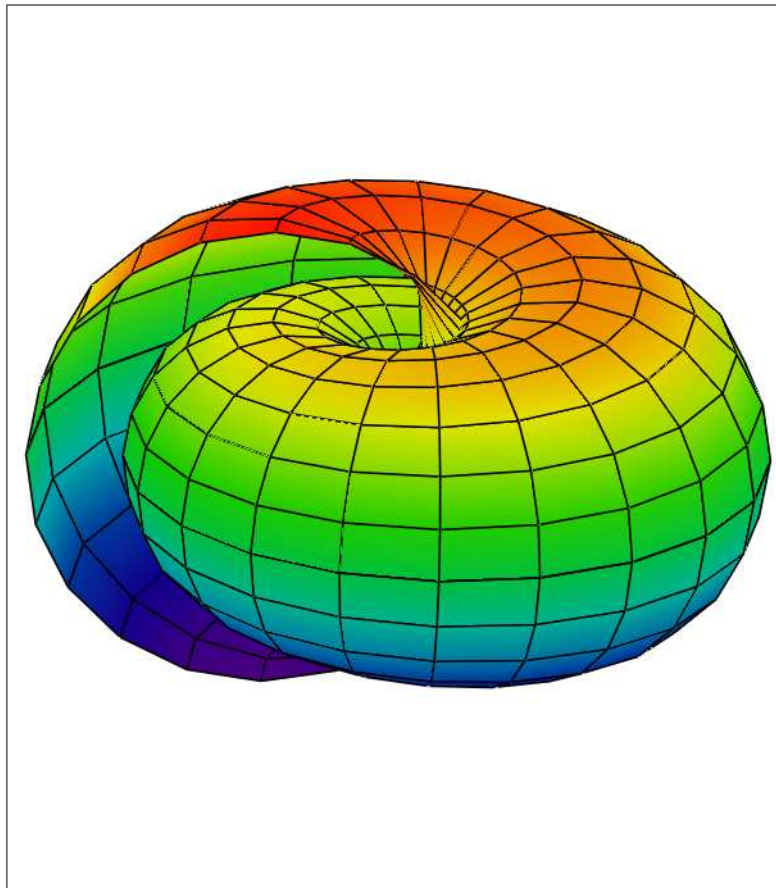
$$\underline{m} := 0..50 \quad n := 0..20 \quad \underline{R} := 10 \quad \phi_m := \frac{3 \cdot \pi \cdot m}{30} \quad \theta_n := \frac{2 \cdot \pi \cdot n}{20}$$

$$f := \text{if} \left(\text{FRAME} \leq 50, 1 - \frac{\text{FRAME}}{50}, -\frac{50 - \text{FRAME}}{50} \right) \quad r(\phi) := \phi$$

$$X_{m,n} := (R + r(\phi_m) \cdot \cos(\theta_n)) \cdot \cos(\phi_m \cdot f)$$

$$Y_{m,n} := (R + r(\phi_m) \cdot \cos(\theta_n)) \cdot \sin(\phi_m \cdot f)$$

$$Z_{m,n} := r(\phi_m) \cdot \sin(\theta_n)$$



(X,Y,Z)

Note: Although it doesn't look like it now, the surface derives from a torus (doughnut).

To see that this is so, set $r(\phi) := 5$ instead of $r(\phi) := \phi$.

To animate the 3D surface plot:

1. Select Tools > Animate > Record.
2. In the Record Animation window, set FRAME to go from 0 to 100.
3. Drag-select the plot:
 - a. Left-click to the upper left of the plot and hold down the left mouse button.
 - b. drag to the right, and then drag down over the entire plot while holding down the left mouse button.
 - c. Release the left mouse button.
4. Left-click on Animate in the Record Animation window.
5. Name and save the .avi video.