# Snail Shell Surface *

These snail-like surfaces are included for their entertaining shapes. Try making one of your own. In spite of their complicated appearance, the snail surfaces are constructed as *one-parameter families of circles* $u \mapsto C_v(u)$. First we introduce two auxiliary variables. The surface parameter $v$ is changed by a quadratic term that permits closing the snails at the top. The parameter ee controls the size of the opening of the snail (default $ee = -2$):

$$vv := v + (v + ee)^2/16.$$

The second variable controls the radius of the circles:

$$s := \exp(-cc \cdot vv). \quad \text{(Note that } s \text{ is a function of } v.\text{)}$$

The circles $u \mapsto C_v(u)$ of radius $s \cdot bb$ lie in an $r$-$y$-plane:

$$r := \quad s \cdot aa \ + \ s \cdot bb \cdot \cos(u),$$

$$y := dd(1 - s) + s \cdot bb \cdot \sin(u).$$

The parameter $dd$ controls the length of the snail from top to bottom. And the other two coordinates in $\mathbb{R}^3$ are

$$x := r \cos(vv),$$

$$z := r \sin(vv),$$

so that the plane of the circle $C_v$ also rotates with $v$.
*Advice*: Make only **small** changes to $cc$ and keep $bb \geq aa$. The `Default Morph` varies $dd$ and adjusts $bb$ a little.

T.K.

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