

Spiraler (6)

Inspireret af artikel:

"Spirals on surfaces of revolution" af Cristian Lazureanu:

<http://elib.mi.sanu.ac.rs/files/journals/vm/57/vmn57p2-10.pdf>

restart

with(plots) :

with(VektorAnalyse4) :

Rotation om z-aksen:

https://en.wikipedia.org/wiki/Rotation_matrix#In_three_dimensions

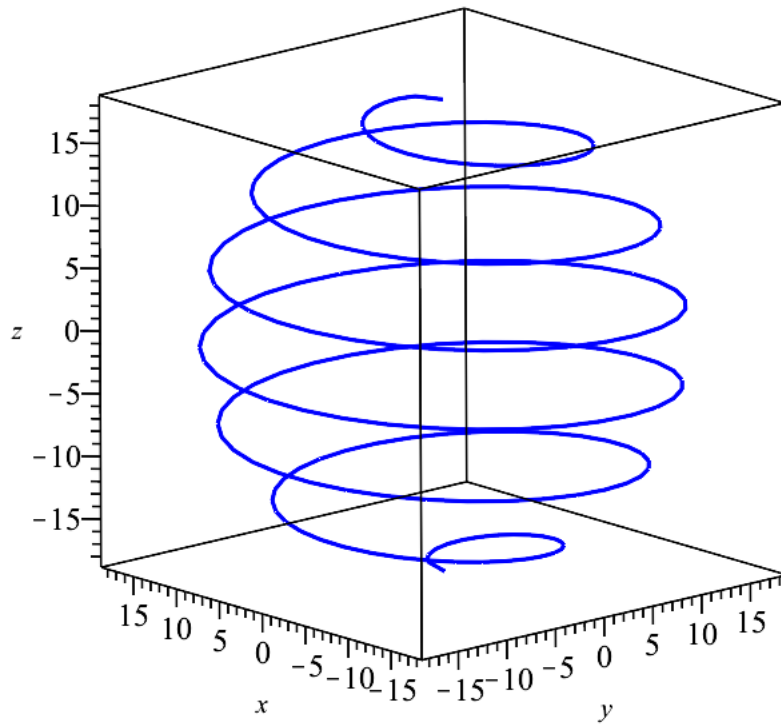
$$R_z(\theta) := \begin{bmatrix} \cos(\theta) & -\sin(\theta) & 0 \\ \sin(\theta) & \cos(\theta) & 0 \\ 0 & 0 & 1 \end{bmatrix} :$$

▼ Sfærisk helix

$$r_{11}(t) := R_z\left(\frac{t}{c}\right) \cdot \langle \sqrt{r^2 - t^2}, 0, t \rangle :$$

$$r_{11}(t) = \begin{bmatrix} \cos\left(\frac{t}{c}\right) \sqrt{r^2 - t^2} \\ \sin\left(\frac{t}{c}\right) \sqrt{r^2 - t^2} \\ t \end{bmatrix}$$

$$R_{11} := \text{spacecurve}\left(\left[\text{vop}\left(\text{subs}\left(r=2 \cdot \pi \cdot 3, c=1, r_{11}(t)\right)\right)\right], t=-2 \cdot \pi \cdot 3 .. 2 \cdot \pi \cdot 3, \text{color} = \text{blue}, \text{thickness} = 3, \text{labels} = [x, y, z], \text{scaling} = \text{constrained}\right)$$

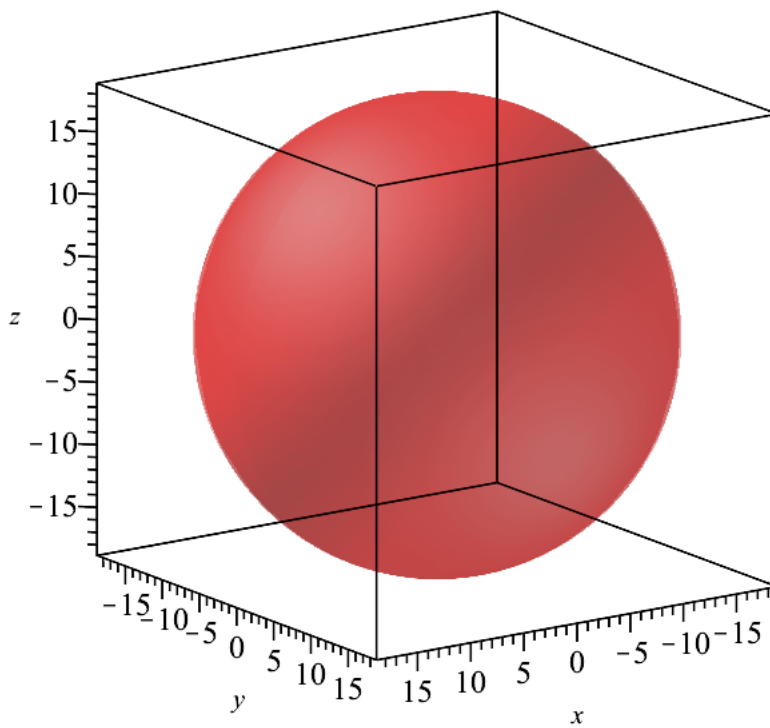


Kugleskal:

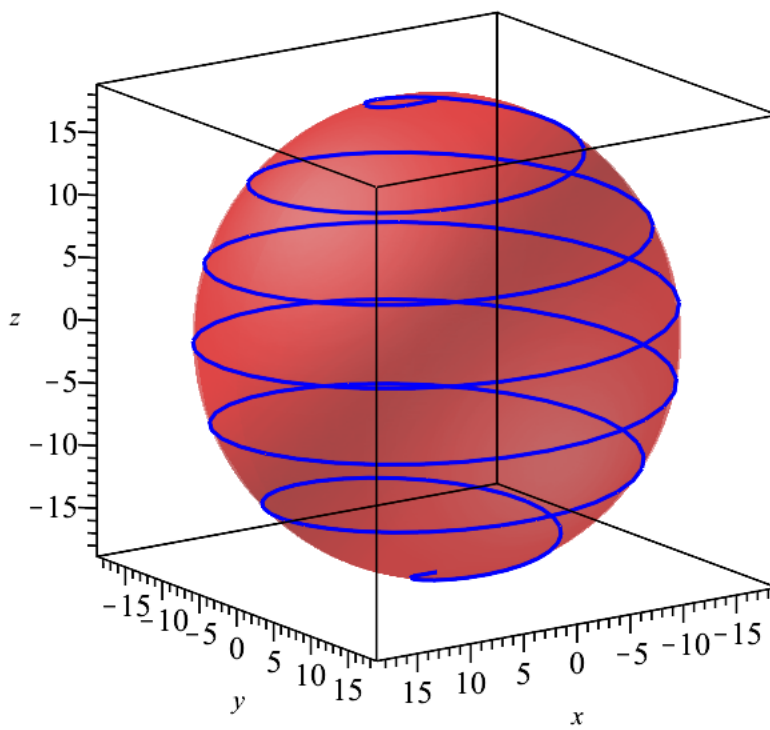
$$r_{kugleskal}(u, v) := R_z\left(\frac{v}{c}\right) \cdot \langle \sqrt{r^2 - u^2}, 0, u \rangle :$$

$$r_{kugleskal}(u, v) = \begin{bmatrix} \cos\left(\frac{v}{c}\right) \sqrt{r^2 - u^2} \\ \sin\left(\frac{v}{c}\right) \sqrt{r^2 - u^2} \\ u \end{bmatrix}$$

$$R_{kugleskal} := \text{plot3d}\left(\text{subs}\left(r=2 \cdot \pi \cdot 3, c=1, r_{kugleskal}(u, v)\right), u=-2 \cdot \pi \cdot 3 .. 2 \cdot \pi \cdot 3, v=-2 \cdot \pi \cdot 3 .. 2 \cdot \pi \cdot 3, \text{color}=\text{red}, \text{transparency}=0.9, \text{labels}=[x, y, z], \text{scaling}=\text{constrained}, \text{numpoints}=10000, \text{style}=\text{patchnograd}\right)$$



$display(R_{11}, R_{kugleskal})$

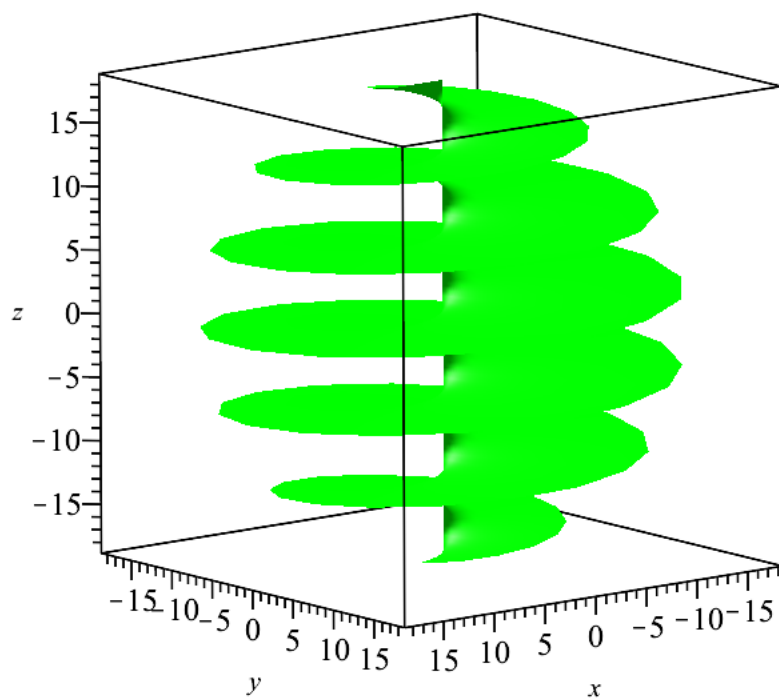


▼ Sfærisk heliocoide

$$r_{12}(u, v) := R_z\left(\frac{u}{c}\right) \cdot \langle v \cdot \sqrt{r^2 - u^2}, 0, u \rangle :$$

$$r_{12}(u, v) = \begin{bmatrix} \cos\left(\frac{u}{c}\right) v \sqrt{r^2 - u^2} \\ \sin\left(\frac{u}{c}\right) v \sqrt{r^2 - u^2} \\ u \end{bmatrix}$$

$R_{12} := \text{plot3d}(\text{subs}(r=2 \cdot \pi \cdot 3, c=1, r_{12}(u, v)), u=-2 \cdot \pi \cdot 3 .. 2 \cdot \pi \cdot 3, v=0 .. 1, \text{color}=\text{green}, \text{labels}=[x, y, z], \text{scaling}=\text{constrained}, \text{numpoints}=10000, \text{style}=\text{patchnograd})$



$\text{display}(R_{12}, R_{\text{kugleskal}})$

