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implicitplot2d()

Draghilev's method

$$F(X) := \left| \begin{array}{l} (x \quad y) \leftarrow (X_0 \quad X_1) \\ \begin{pmatrix} \tan(x \cdot y + 0.1) - x^2 \\ x^2 + 2 \cdot y^2 - 1 \end{pmatrix} \end{array} \right.$$

$$D(t,x) := \text{Draghilev}(F(x)) \rightarrow \begin{bmatrix} -x_0 \cdot (x_3)^2 + 1.0 \cdot x_0 - \tan(x_0 \cdot x_1 + 0.1)^2 \cdot x_0 \cdot (x_3)^2 + 1.0 \cdot \tan(x_0 \cdot x_1 + 0.1)^2 \cdot x_0 + -2.0 \cdot x_0 \cdot (x_4)^2 + -4.0 \cdot x_1 \cdot (x_3)^2 + \\ 2.0 \cdot x_0 - \tan(x_0 \cdot x_1 + 0.1)^2 \cdot x_1 - x_1 + -4.0 \cdot x_0 \cdot (x_4)^2 + 1.0 \cdot x_1 \cdot (x_3)^2 + 2.0 \cdot x_1 \cdot (x_4)^2 + -2.0 \cdot \tan(x_3 \cdot x_4 + 0.1) \cdot x_0 + 1. \\ -2.0 \cdot (x_0)^2 + 4.0 \cdot (x_1)^2 + -8.0 \cdot x_0 \cdot x_1 + -2.0 \cdot \tan(x_0 \cdot x_1 + 0.1)^2 \cdot (x_0)^2 + 4.0 \cdot \\ 0 \\ 0 \end{bmatrix}$$

Given $\quad F(\text{stack}(x,y))_1 = 0 \quad$ $\text{GetX0}(x,y) := \text{Find}(x,y)$

$X0 := \text{GetX0}(0,1)$ $\quad tmin := 0$ $\quad tmax := -22.5$ $\quad N := 100$ $\quad ii := 0 .. N - 1$

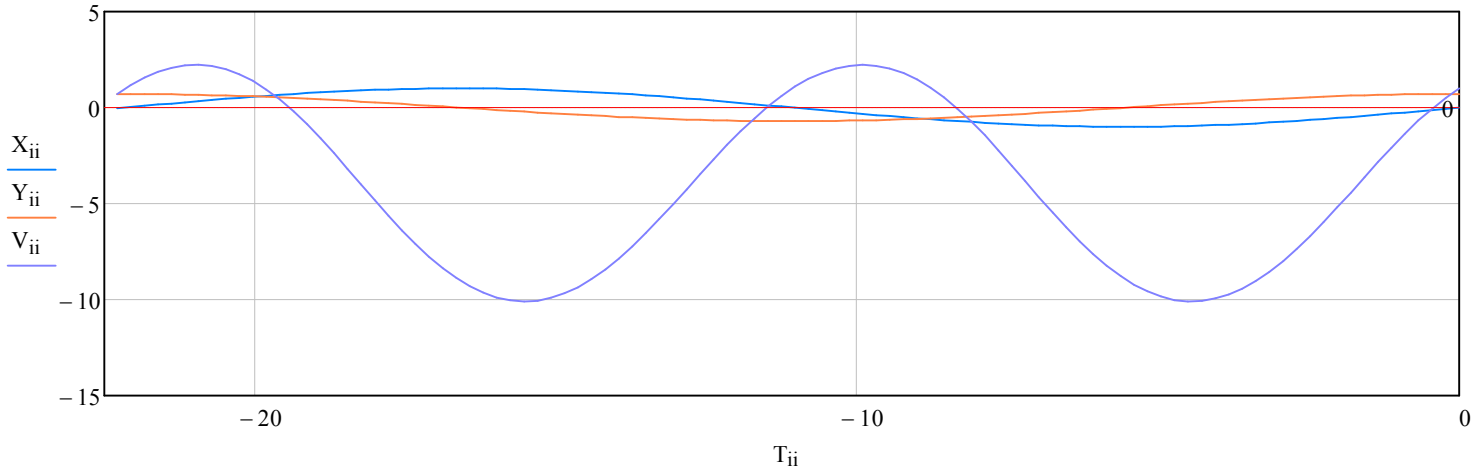
$\text{result} := \text{rkfixed}(\text{stack}(X0, 1, X0), tmin, tmax, N, D)$

$T := \text{result}^{\langle 0 \rangle}$ $\quad X := \text{result}^{\langle 1 \rangle}$ $\quad Y := \text{result}^{\langle 2 \rangle}$ $\quad V := \text{result}^{\langle 3 \rangle}$

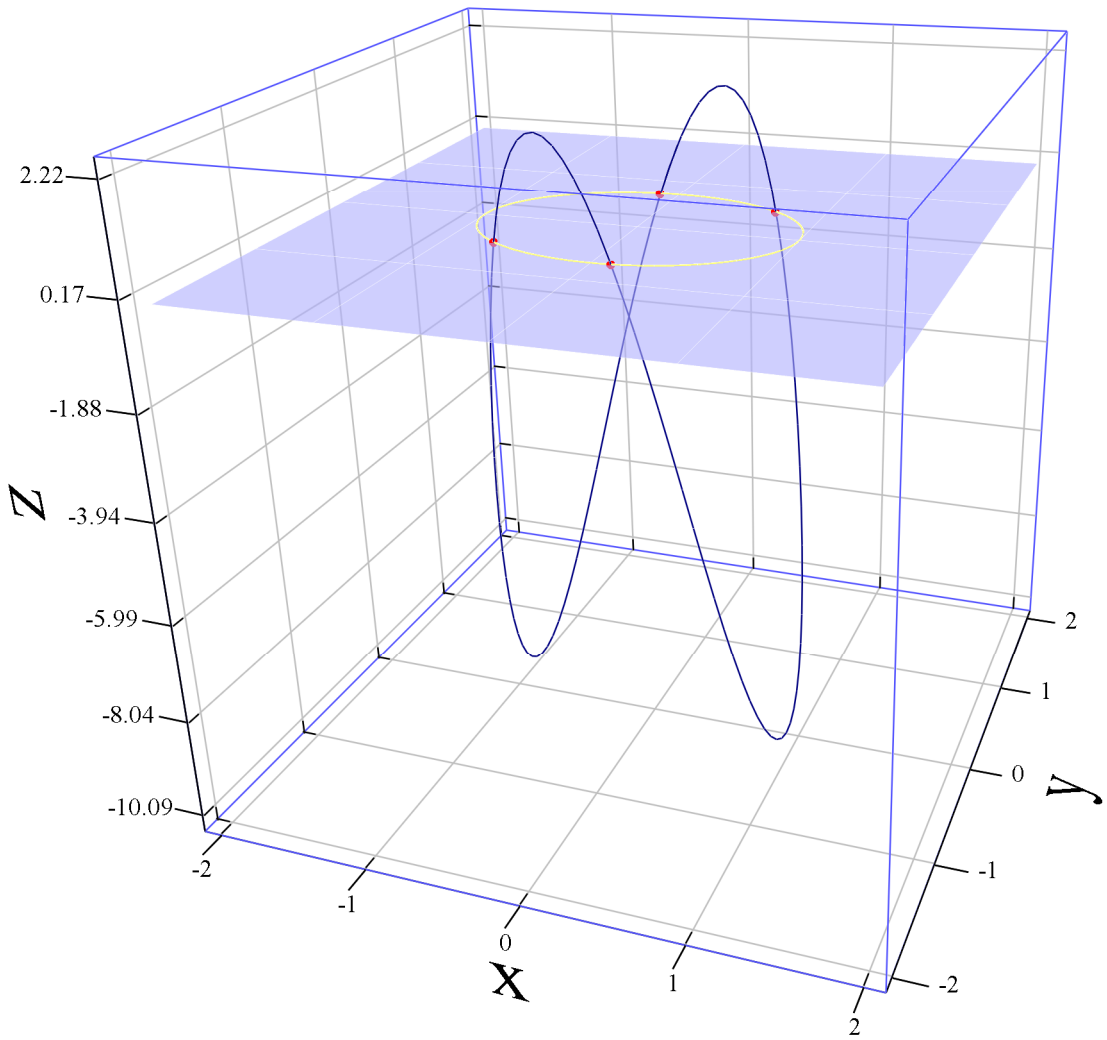
$$\text{Roots}(res) := \left| \begin{array}{l} n \leftarrow \dfrac{\text{cols}(res)}{2} \\ v \leftarrow res^{\langle n \rangle} \\ nv \leftarrow \text{Search}(v) \\ \text{for } ii \in 0 .. \text{length}(nv) - 1 \\ \quad \text{for } jj \in 1 .. n - 1 \\ \quad\quad out_{ii,jj-1} \leftarrow \text{Interpol}\left[\left(res^{\langle jj \rangle}\right)_{(nv_{ii})}, \left(res^{\langle jj \rangle}\right)_{(nv_{ii}+1)}, v_{(nv_{ii})}, v_{(nv_{ii}+1)} \right] \\ out \end{array} \right.$$

$roots := \text{Roots}(result)$ $\quad \text{rows}(roots) = 4$

$$roots^T = \begin{pmatrix} -0.121 & -0.698 & 0.121 & 0.697 \\ 0.702 & -0.506 & -0.702 & 0.506 \end{pmatrix}$$



$Curve := (X \quad Y \quad V)^T$ $Plane(x,y) := 0$ $CurveProj := (X \quad Y \quad V \cdot 0)^T$ $RootsPoints := \left(roots^{\langle 0 \rangle} \quad roots^{\langle 1 \rangle} \quad roots^{\langle 0 \rangle} \cdot 0\right)^T$



$xmin := -1.5 \quad ymin := -1.5 \quad xmax := 1.5 \quad ymax := 1.5$

$$coords := \begin{pmatrix} xmax & ymax \\ xmin & ymin \end{pmatrix}$$

$(nx \quad ny) := (30 \quad 30) \qquad grids := (nx \quad ny)^T$

$f(x,y) := F(stack(x,y))_1 \qquad S1 := implicitplot2d(f, coords, grids)$

$(nx \quad ny) := (200 \quad 200) \qquad grids := (nx \quad ny)^T$

$f(x,y) := F(stack(x,y))_0 \qquad S2 := implicitplot2d(f, coords, grids)$