Rolling Curve over Curve - Dragilev Method

Example Roll f over f1 and f2, forcing constant speeds. $N:=20$ $\nu:=90$ Frames

$f:=x^2+6\cdot y^2-3$ $xo:=0$ $s:=8$

$f_2:=2\cdot\left(x^2\right)+6\cdot y^2-170$ $xo_2:=0$ $s_2:=-50$

$f_3:=y^2-3\cdot x-15$ $xo_3:=10$ $s_3:=-35$

$\tau:=[1..\nu]$ $T_\tau:=4\cdot\frac{\tau-1}{\nu-1}$

$n:=[1..3]$ $m:=\frac{9-n}{8}\cdot N$

$RK(f, xo, yo, s, N):=$

$$\begin{aligned}
:= \;& xyo:=\text{stack}\left(xo, \text{roots}\left(f|_{x=xo}, y, yo\right)\right)\\
& [x\;\; y]:=[u_1\;\; u_2]\\
& D(t,u):=\frac{\left(\Delta:=\text{stack}\left(-\frac{d}{dy}f, \frac{d}{dx}f\right)\right)}{\text{norme}(\Delta)}\\
& U:=\text{Rkadapt}(xyo, 0, s, N-1, D)\\
& [\text{col}(U,1)\;\; \text{col}(U,2)\;\; \text{col}(U,3)]
\end{aligned}$$

$[T_1\;\; X\;\; Y]:=RK(f, xo, 1, s, N)$

$[T_2\;\; X_2\;\; Y_2]:=RK(f_2, xo_2, 1, s_2, 200)$

$[T_3\;\; X_3\;\; Y_3]:=RK(f_3, xo_3, -1, s_3, 200)$

$M_\tau:=(X+i\cdot Y)\cdot e^{-2\cdot\pi\cdot i\cdot T_\tau}$

$MC(f, so, To, X, Y):=$

$$\begin{aligned}
:= \;& \Xi_\tau:=\text{eval}\left(\text{cinterp}\left(To, X, \text{mod}\left(-s\cdot T_\tau, so\right)\right)\right)\\
& \Psi_\tau:=\text{eval}\left(\text{cinterp}\left(To, Y, \text{mod}\left(-s\cdot T_\tau, so\right)\right)\right)\\
& \theta(x,y):=\text{atan}\left(\frac{d}{dy}f, \frac{d}{dx}f\right)-\frac{\pi}{2}\\
& \left[\theta_\tau:=\text{eval}\left(\theta\left(\Xi_\tau, \Psi_\tau\right)\right)\;\; Z_\tau:=\Xi_\tau+i\cdot\Psi_\tau\right]\\
& \Big[\mu_\tau:=\text{eval}\left(\left(M_\tau-i\cdot\min\left(\text{Im}\left(M_\tau\right)\right)\right)\cdot e^{i\cdot\theta_\tau}+Z_\tau\right)\\
& \chi_{n\,\tau}:=\text{eval}\left(\text{stack}\left(\begin{cases}\text{if } \tau=1 & \text{matrix}(0,1)\\ \text{else} & \chi_{n\,\tau-1}\end{cases}, \mu_{\tau_{m_n}}\right)\right)\Big]
\end{aligned}$$

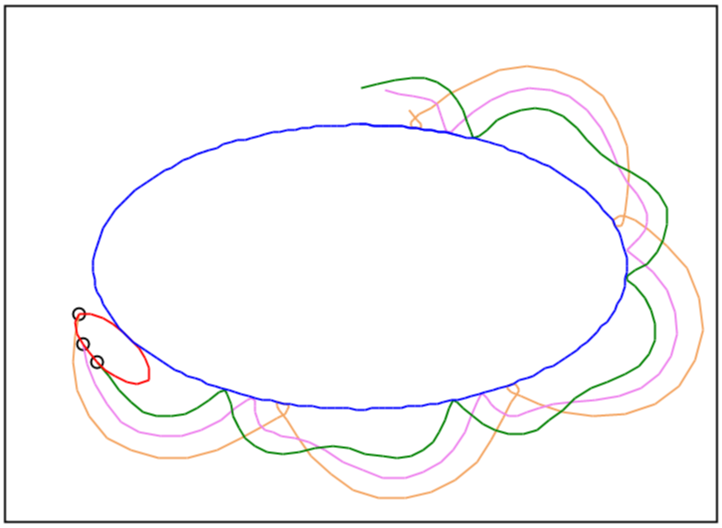
$\begin{bmatrix}M2\\C2\end{bmatrix}:=MC(f_2, s_2, T_2, X_2, Y_2)$

$\begin{bmatrix}M3\\C3\end{bmatrix}:=MC(f_3, s_3, T_3, X_3, Y_3)$

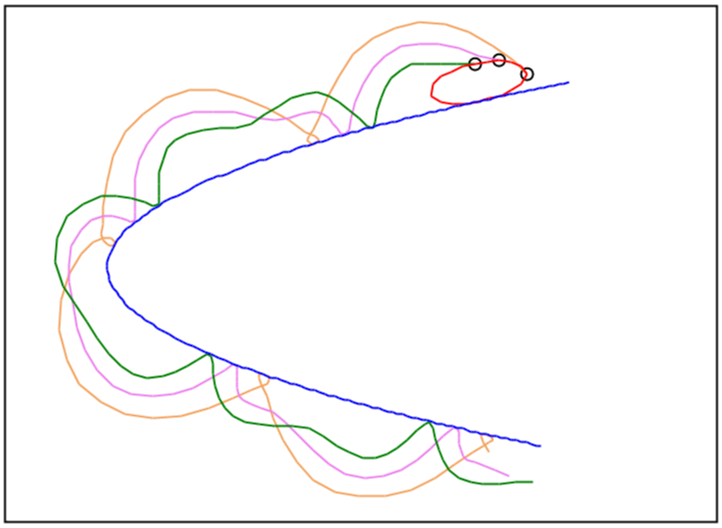
$ReIm(z):=\text{augment}(\text{Re}(z), \text{Im}(z))$

$Plot(X, Y, M, C):=$

$$:= \begin{cases}\text{augment}(X, Y)\\ ReIm\left(M_t\right)\\ \text{mat2sys}_1\left(\delta_n:=ReIm\left(C_{n\,t}\right)\right)\\ \text{mat2sys}_1\left(\delta_n:=\text{augment}\left(ReIm\left(M_{t_{m_n}}\right), \text{"o"}\right)\right)\end{cases}$$



$Plot(X_2, Y_2, M2, C2)$



$Plot(X_3, Y_3, M3, C3)$

Alvaro $\text{appVersion}(4)=$ "1.2.9018.0"