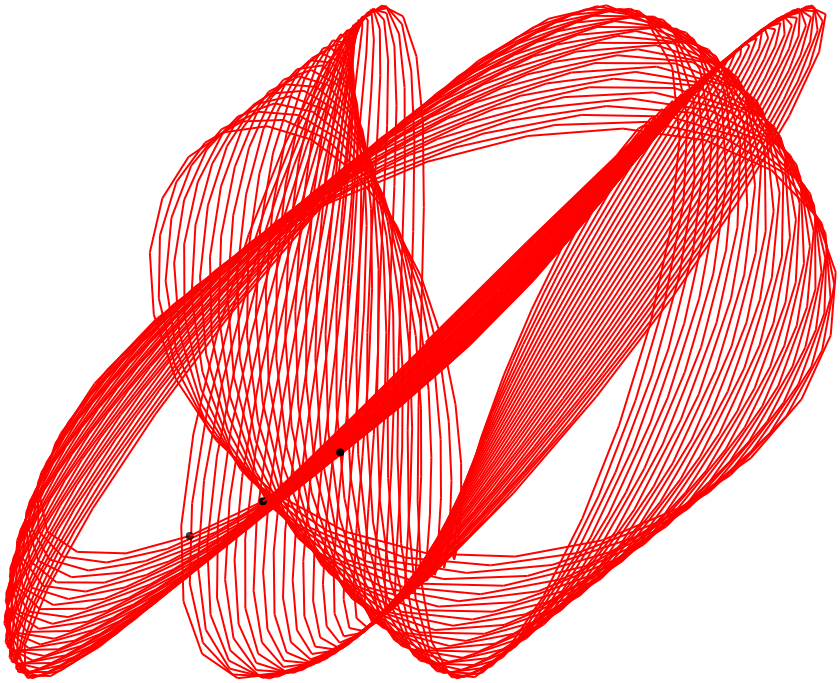
David Chudzicki

- about
- posts

Harmonograph



Settings

Frequencies:

f_0 3.00 f_1 2.00 f_2 3.01

Phases:

f_0 0.00 f_1 0.00 f_2 0.00

Amplitudes:

f_0 1.00 f_1 1.00 f_2 1.00

Fade out old points?

About this Harmonograph

(source code)

After talking with John Baez and looking at some pictures of harmonographs (1, 2), it seems to me the two pendula attached to the pen can be approximated as two (probably orthogonal) vectors v_1 and v_2 that combine additively. The third pendulum adds an offset to the paper, so its effect is also additive.

So the position of the pen (relative to the paper) at time t is:

$$v_1 + v_2 + v_3$$

where

$$v_i = A_i \sin(f_i t + \Phi_i)$$

where:

- f_i is the frequency of pendulum i,
- Φ_i is an adjustment to the phase,
- A_i is the amplitude