EQUATIONS

$$\dot{\vec{x}} = FFT^{-1}\left(diag(ik)\, FFT(\vec{x})\right) \tag{0.1}$$

$$\ddot{\vec{x}} = FFT^{-1}\left(diag(-k^2)\, FFT(\vec{x})\right) \tag{0.2}$$

$$\kappa = \frac{\dot{\vec{x}} \times \ddot{\vec{x}}}{\dot{x}^3} \tag{0.3}$$

$$g(\kappa) = \tan^{-1}(\kappa) \tag{0.4}$$

$$\vec{x}^{n+1} = \vec{x}^n + \Delta t\, g(\kappa)\hat{n} \tag{0.5}$$

In 2D

$$a = [a_1, a_2, \ldots, a_N]^T \tag{0.6}$$

$$b = [b_1, b_2, \ldots, b_N]^T \tag{0.7}$$

$$\vec{x} = [a, b] \tag{0.8}$$

$$k = \frac{\dot{a}\ddot{b} - \dot{b}\ddot{a}}{\left(a^2 + b^2\right)^{3/2}} \tag{0.9}$$

$$\hat{n} = \begin{cases} [-\dot{b}, \dot{a}] & \text{if} \quad \dot{a}\dot{b} > 0 \\ [\dot{b}, -\dot{a}] & \text{otherwise} \end{cases} \tag{0.10}$$