Calculations for IFS for flowsnake

$deg := \frac{\mathrm{Pi}}{180}$

$$\frac{1}{180}\,\pi \tag{1}$$

$A := \frac{\arcsin\left(\frac{\mathrm{sqrt}(3)}{2\cdot\mathrm{sqrt}(7)}\right)\cdot 180}{\mathrm{Pi}}$

$$\frac{180\,\arcsin\left(\frac{1}{14}\sqrt{3}\sqrt{7}\right)}{\pi} \tag{2}$$

$evalf(A)$

$$19.10660535 \tag{3}$$

$r := \frac{1}{\mathrm{sqrt}(7)}$

$$\frac{1}{7}\sqrt{7} \tag{4}$$

Rotation matrix in degrees, with scaling by r

$rot := x \rightarrow \begin{bmatrix} expand(r\cdot\cos(x\cdot deg)) & expand(-r\cdot\sin(x\cdot deg)) \\ expand(r\cdot\sin(x\cdot deg)) & expand(r\cdot\cos(x\cdot deg)) \end{bmatrix}:$

Matrix for segments 1 and 4

$M1 := rot(A-120)$

$$\begin{bmatrix} -\frac{1}{14} & \frac{3}{14}\sqrt{3} \\ -\frac{3}{14}\sqrt{3} & -\frac{1}{14} \end{bmatrix} \tag{5}$$

Matrix for segments 2, 3, 5, and 7

$M2 := rot(A)$

$$\begin{bmatrix} \frac{5}{14} & -\frac{1}{14}\sqrt{3} \\ \frac{1}{14}\sqrt{3} & \frac{5}{14} \end{bmatrix} \tag{6}$$

Matrix for segment 6

$M3 := rot(120+A)$

$$\begin{bmatrix} -\frac{2}{7} & -\frac{1}{7}\sqrt{3} \\ \frac{1}{7}\sqrt{3} & -\frac{2}{7} \end{bmatrix} \quad (7)$$

Points needed for translations

$P1 := expand([r\cdot\cos((60+A)\cdot deg), r\cdot\sin((60+A)\cdot deg)])$

$$\left[\frac{1}{14}, \frac{3}{14}\sqrt{3}\right] \quad (8)$$

$P2 := P1 + expand([r\cdot\cos(A\cdot deg), r\cdot\sin(A\cdot deg)])$

$$\left[\frac{3}{7}, \frac{2}{7}\sqrt{3}\right] \quad (9)$$

$P3 := P2 + expand([r\cdot\cos(A\cdot deg), r\cdot\sin(A\cdot deg)])$

$$\left[\frac{11}{14}, \frac{5}{14}\sqrt{3}\right] \quad (10)$$

$P4 := expand([r\cdot\cos(A\cdot deg), r\cdot\sin(A\cdot deg)])$

$$\left[\frac{5}{14}, \frac{1}{14}\sqrt{3}\right] \quad (11)$$

$P5 := expand([1 - r\cdot\cos(A\cdot deg), -r\cdot\sin(A\cdot deg)])$

$$\left[\frac{9}{14}, -\frac{1}{14}\sqrt{3}\right] \quad (12)$$

Decimal values for matrices and translation vectors

$evalf(M1)$

$$\begin{bmatrix} -0.07142857143 & 0.3711537446 \\ -0.3711537446 & -0.07142857143 \end{bmatrix} \quad (13)$$

$evalf(M2)$

$$\begin{bmatrix} 0.3571428571 & -0.1237179149 \\ 0.1237179149 & 0.3571428571 \end{bmatrix} \quad (14)$$

$evalf(M3)$

$$\begin{bmatrix} -0.2857142857 & -0.2474358298 \\ 0.2474358298 & -0.2857142857 \end{bmatrix} \quad (15)$$

$evalf(P1)$

$$[0.07142857143, 0.3711537446] \quad (16)$$

$evalf(P2)$

$$[0.4285714286, 0.4948716594] \quad (17)$$

$evalf(P3)$

$$[0.7857142857, 0.6185895742] \quad (18)$$

$evalf(P4)$

$$[0.3571428571, 0.1237179149] \quad (19)$$

$evalf(P5)$

$$[0.6428571429, -0.1237179149] \quad \textbf{(20)}$$

Verify the trig values for the rotation angles

$expand(\sin(A \cdot deg))$

$$\frac{1}{14}\sqrt{3}\sqrt{7} \quad \textbf{(21)}$$

$expand(\cos(A \cdot deg))$

$$\frac{5}{14}\sqrt{7} \quad \textbf{(22)}$$

$expand(\sin((A-120) \cdot deg))$

$$-\frac{3}{14}\sqrt{3}\sqrt{7} \quad \textbf{(23)}$$

$expand(\cos((A-120) \cdot deg))$

$$-\frac{1}{14}\sqrt{7} \quad \textbf{(24)}$$

$expand(\sin((A+120) \cdot deg))$

$$\frac{1}{7}\sqrt{3}\sqrt{7} \quad \textbf{(25)}$$

$expand(\cos((A+120) \cdot deg))$

$$-\frac{2}{7}\sqrt{7} \quad \textbf{(26)}$$