

## Calculations for IFS for flowsnake using hexagons

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

$$\frac{1}{180} \pi \quad (1)$$

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

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

$$\text{evalf}(A)$$

$$19.10660535 \quad (3)$$

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

$$\frac{1}{7} \sqrt{7} \quad (4)$$

**Scaling/Rotation matrix in x 0.degrees, with scaling by r**

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

$$\text{rot}(A)$$

$$\begin{bmatrix} \frac{5}{14} & -\frac{1}{14} \sqrt{3} \\ \frac{1}{14} \sqrt{3} & \frac{5}{14} \end{bmatrix} \quad (5)$$

$$\text{evalf}(\text{rot}(A))$$

$$\begin{bmatrix} 0.3571428571 & -0.1237179149 \\ 0.1237179149 & 0.3571428571 \end{bmatrix} \quad (6)$$

*with(LinearAlgebra) :*  
 $v1 := \text{Vector}([0, 1])$

$$\begin{bmatrix} 0 \\ 1 \end{bmatrix} \quad (7)$$

$T1 := v1 - \text{Multiply}(\text{rot}(A), v1)$

$$\begin{bmatrix} \frac{1}{14} \sqrt{3} \\ \frac{9}{14} \end{bmatrix} \quad (8)$$

$$v2 := \text{Vector}\left(\left[\frac{\sqrt{3}}{2}, \frac{1}{2}\right]\right)$$

$$\begin{bmatrix} \frac{1}{2} \sqrt{3} \\ \frac{1}{2} \end{bmatrix}$$

**(9)**

$$T2 := v2 - \text{Multiply}(\text{rot}(A), v2)$$

$$\begin{bmatrix} \frac{5}{14} \sqrt{3} \\ \frac{3}{14} \end{bmatrix}$$

**(10)**

$$v3 := \text{Vector}\left(\left[\frac{\sqrt{3}}{2}, -\frac{1}{2}\right]\right)$$

$$\begin{bmatrix} \frac{1}{2} \sqrt{3} \\ -\frac{1}{2} \end{bmatrix}$$

**(11)**

$$T3 := v3 - \text{Multiply}(\text{rot}(A), v3)$$

$$\begin{bmatrix} \frac{2}{7} \sqrt{3} \\ -\frac{3}{7} \end{bmatrix}$$

**(12)**

$$T4 := -T1$$

$$\begin{bmatrix} -\frac{1}{14} \sqrt{3} \\ -\frac{9}{14} \end{bmatrix}$$

**(13)**

$$T5 := -T2$$

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

**(14)**

$$T6 := -T3$$

$$\begin{bmatrix} -\frac{2}{7}\sqrt{3} \\ \frac{3}{7} \end{bmatrix} \quad (15)$$

*evalf(T1)*

$$\begin{bmatrix} 0.1237179149 \\ 0.6428571429 \end{bmatrix} \quad (16)$$

*evalf(T2)*

$$\begin{bmatrix} 0.6185895742 \\ 0.2142857143 \end{bmatrix} \quad (17)$$

*evalf(T3)*

$$\begin{bmatrix} 0.4948716594 \\ -0.4285714286 \end{bmatrix} \quad (18)$$

*evalf(T4)*

$$\begin{bmatrix} -0.1237179149 \\ -0.6428571429 \end{bmatrix} \quad (19)$$

*evalf(T5)*

$$\begin{bmatrix} -0.6185895742 \\ -0.2142857143 \end{bmatrix} \quad (20)$$

*evalf(T6)*

$$\begin{bmatrix} -0.4948716594 \\ 0.4285714286 \end{bmatrix} \quad (21)$$