arccos, atan2 from trigonometry

ElementSets from MeshConnectivity

Faces, OrientedOppositeFaces, VertexOneRing, NeighborVerticesInFace, OrientedVertices from Neighborhoods(M)

M : FaceMesh
$x_i \in \mathbb{R}^3$

$$V, E, F = \textit{ElementSets}(M)$$

$$\theta(i,f) = arccos\left(\frac{(x_j - x_i)\cdot(x_k - x_i)}{\|x_j - x_i\|\|x_k - x_i\|}\right)$$

where

$$i \in V$$
$$f \in F$$
$$j, k = \textit{NeighborVerticesInFace}(f, i)$$

$$K(i) = 2\pi - \sum_{f \in \textit{Faces}(i)} \theta_{i,f} \text{ where } i \in V$$

$$\textit{area}(f) = \tfrac{1}{2}\|(x_j - x_i) \times (x_k - x_i)\|$$

where

$$f \in F$$
$$i, j, k = \textit{OrientedVertices}(f)$$

$$N(f) = \frac{(x_j - x_i) \times (x_k - x_i)}{2\textit{area}(f)}$$

where

$$f \in F$$
$$i, j, k = \textit{OrientedVertices}(f)$$

$$l(i,j) = \|x_j - x_i\| \text{ where } i, j \in V$$

$$\phi(i,j) = atan2(e \cdot (n_1 \times n_2), n_1 \cdot n_2)$$

where

$$i, j \in V$$
$$e = \frac{x_j - x_i}{\|x_j - x_i\|}$$
$$f_1, f_2 = \textit{OrientedOppositeFaces}(i, j)$$
$$n_1 = N(f_1)$$
$$n_2 = N(f_2)$$

$$H(i) = \frac{1}{4}\sum_{j \in \textit{VertexOneRing}(i)} l_{i,j}\phi_{i,j} \text{ where } i \in V$$