Area of hybrid region quads q_j and triangles t_k around v_i

$$A(v_i) = \sum_{j=1}^{m} A(q_j) + \sum_{k=1}^{r} A(t_k)$$

Applying Mean Average Area

$$A(v_i) = \frac{1}{2} \sum_{j=1}^{m} \left[A(t_{j1}^*) + A(t_{j2}^*) + A(t_{j3}^*) \right] + \sum_{k=1}^{r} A(t_k)$$

Applying Laplace Beltrami operator

$$\Delta(v_i) = \frac{1}{2} \sum_{j=1}^{m} \left[\Delta(t_{j1}^*) + \Delta(t_{j2}^*) + \Delta(t_{j3}^*) \right] + \sum_{k=1}^{r} \Delta(t_k)$$

Rewriting $\Delta(v_i)$. We define the *Triangle Quad Laplace Beltrami Operator*

$$\Delta(v_i) = \frac{1}{2A_i} \sum_{j=1}^{n} w_{ij} \left(v_j - v_i \right)$$