Heat Equation With Forward Euler

We will solve heat equation

$$u' = \alpha \Delta u \tag{1}$$

using forward Euler.

We use the discrete Laplacian operator for triangle meshes:

$$\Delta u_i = \frac{1}{2} \sum_j (\cot \alpha_{ij} + \cot \beta_{ij})(u_j - u_i) \tag{2}$$

Applying forward Euler to Eq(1), we get for each vertex i:

$$u_i^{k+1} = u_i^k + \tau \alpha \Delta u_i^k \tag{3}$$