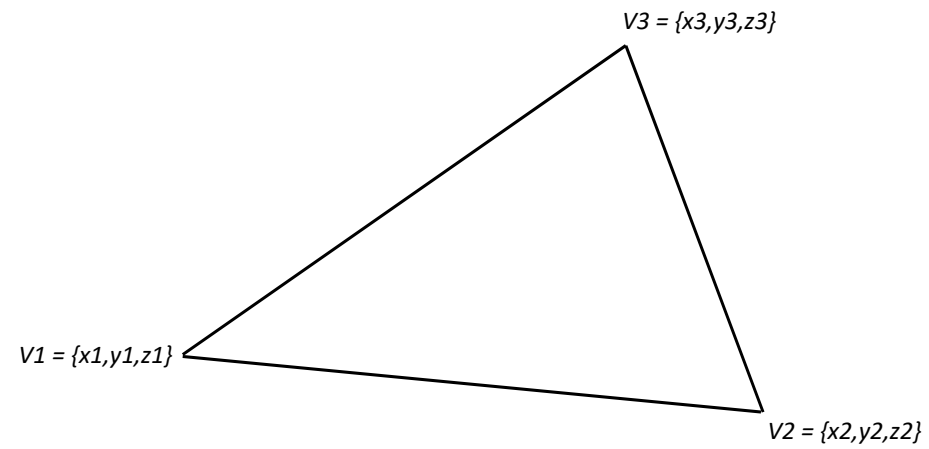


Triangle UV texture mapping coordinates calculation

LAIG, MIEIC, FEUP

Ver.20191001b

Vertex definition



Distance calculation between vertices

Distances:

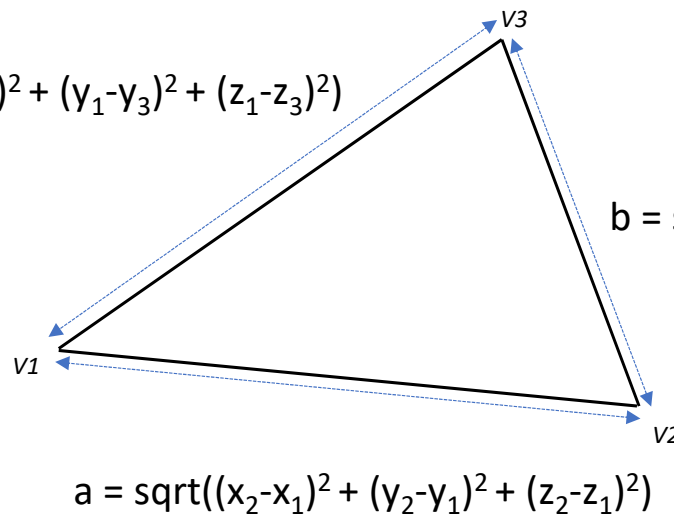
$$a = \overline{V1 V2}$$

$$b = \overline{V2 V3}$$

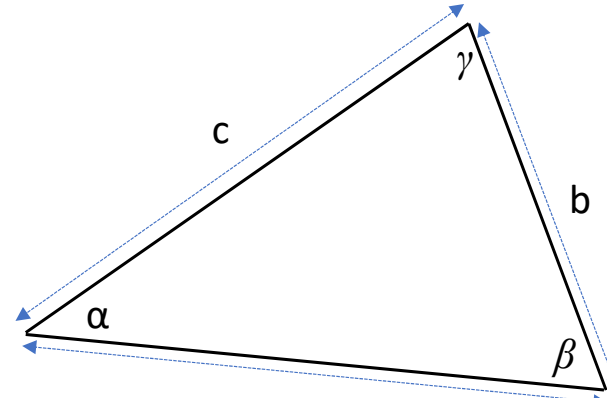
$$c = \overline{V3 V1}$$

$$c = \text{sqrt}((x_1 - x_3)^2 + (y_1 - y_3)^2 + (z_1 - z_3)^2)$$

$$b = \text{sqrt}((x_3 - x_2)^2 + (y_3 - y_2)^2 + (z_3 - z_2)^2)$$



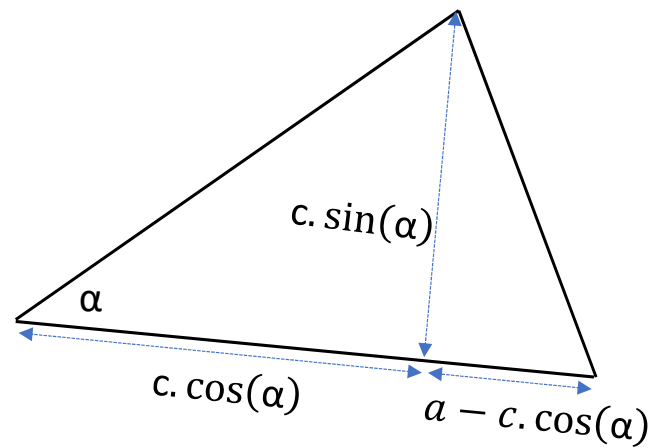
Internal angle calculation for α , β , γ


$$\cos(\alpha) = \frac{a^2 - b^2 + c^2}{2ac}$$
$$\cos(\beta) = \frac{a^2 + b^2 - c^2}{2ab}$$
$$\cos(\gamma) = \frac{-a^2 + b^2 + c^2}{2bc}$$

NOTE: α , β , γ are lowercase greek letters alfa, beta and gamma, respectively. Commonly represente angles.

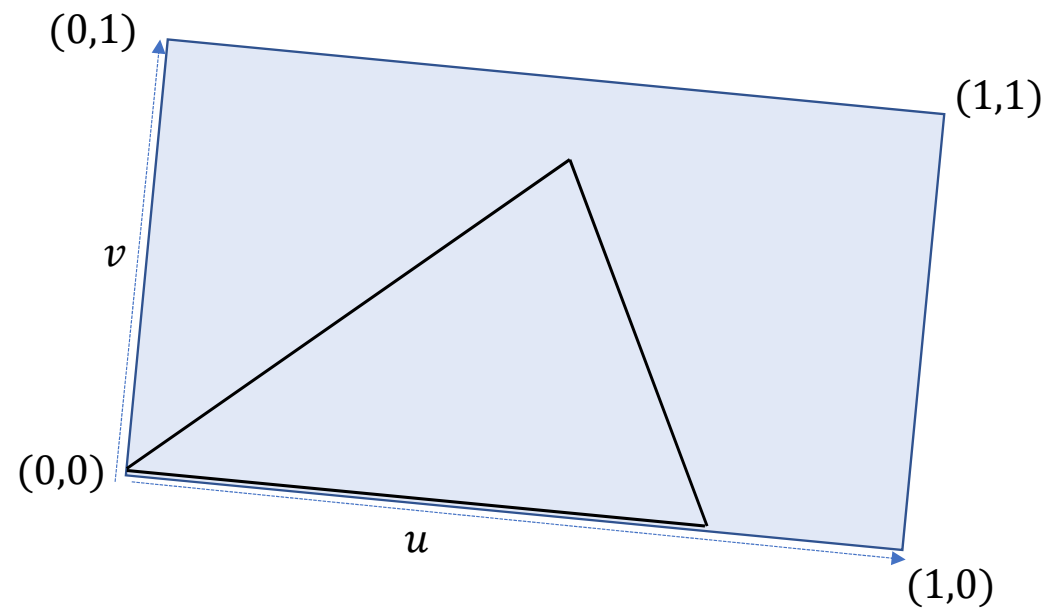
Internal distances calculation with respect to α

a and c are distances
between vertices
(previous slide).

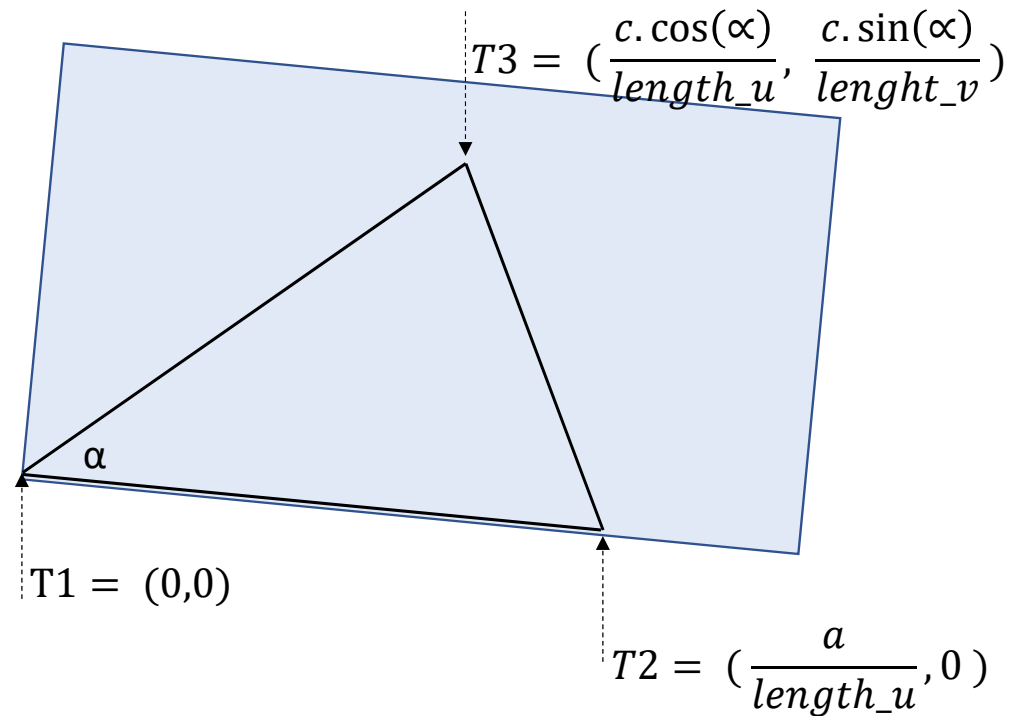


UV map layout over triangle

Assuming u and v normalized



UV texture mapping coordinates calculation
T1, T2 and T3 for vertices V1, V2 and V3
(supported by angle α)



$$\cos(\alpha) = \frac{a^2 - b^2 + c^2}{2ac}$$

$$\sin(\alpha) = \sqrt{1 - \cos^2(\alpha)}$$