COMP5411 Programming Assignment 1

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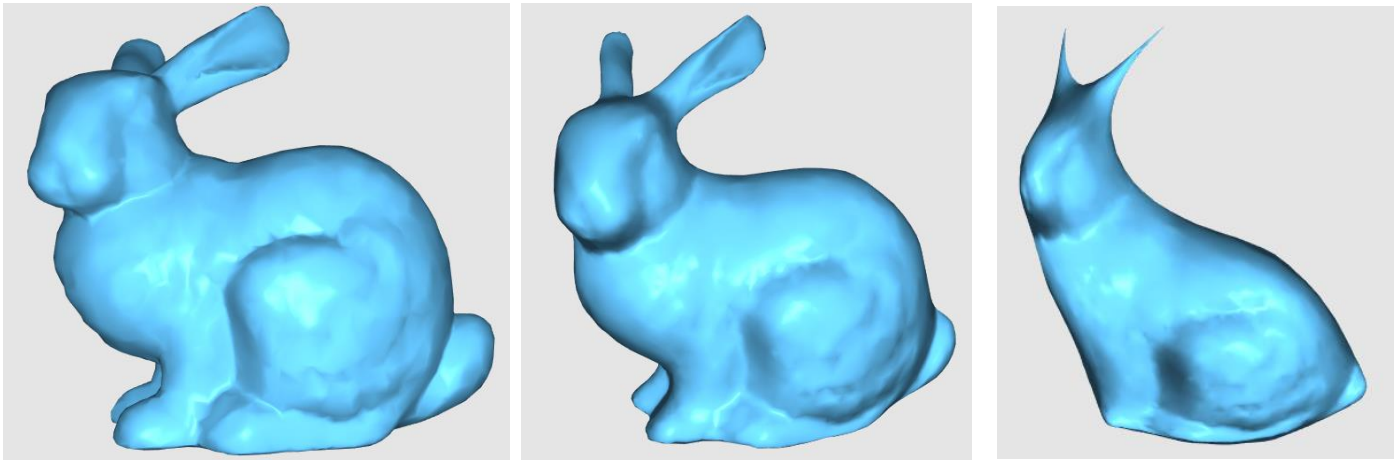
1) Screenshots of the meshes before and after Laplacian smoothing

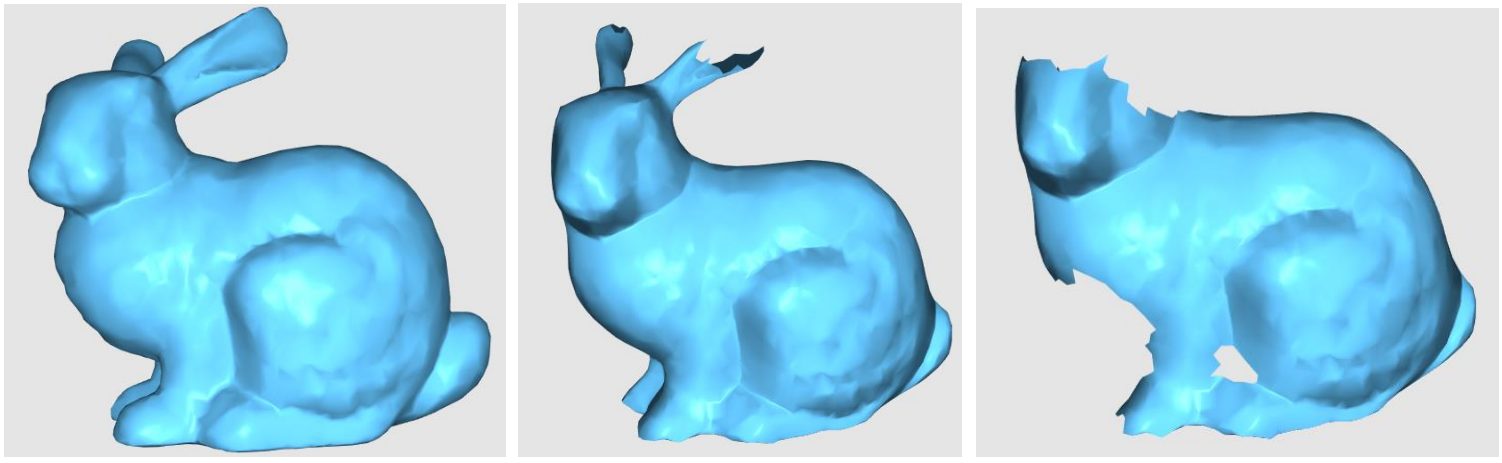
Test-case mesh: bunny.obj

a) Explicit Umbrella Smooth:

Uniform-Weight Laplacian with the λ =0.5, iter = 0, 10, 100

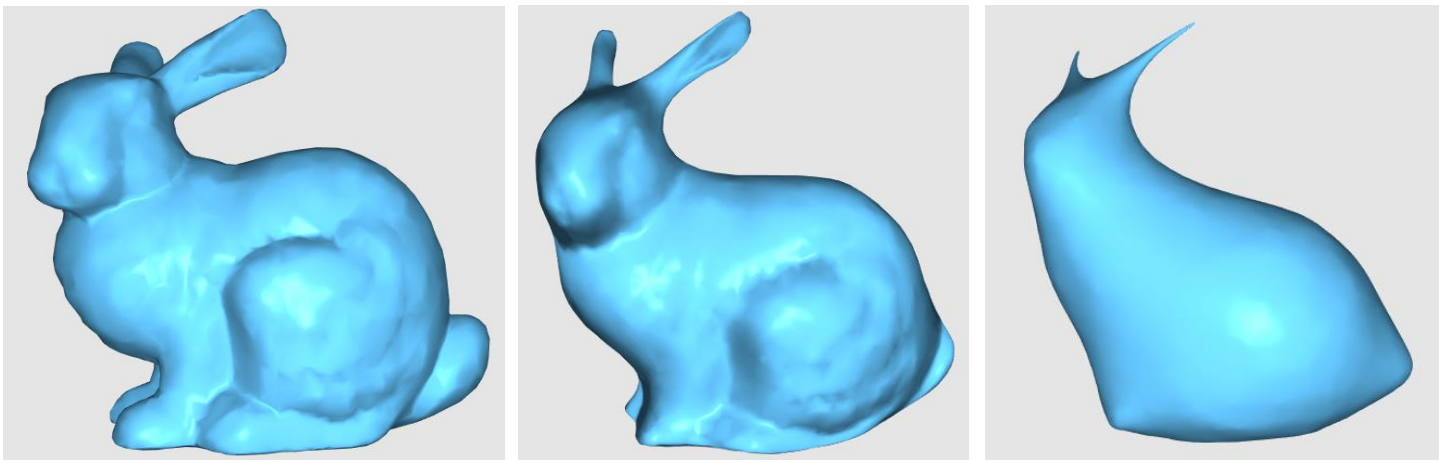


Cotangent-Weight Laplacian with the λ =0.5, iter = 0, 15, 30

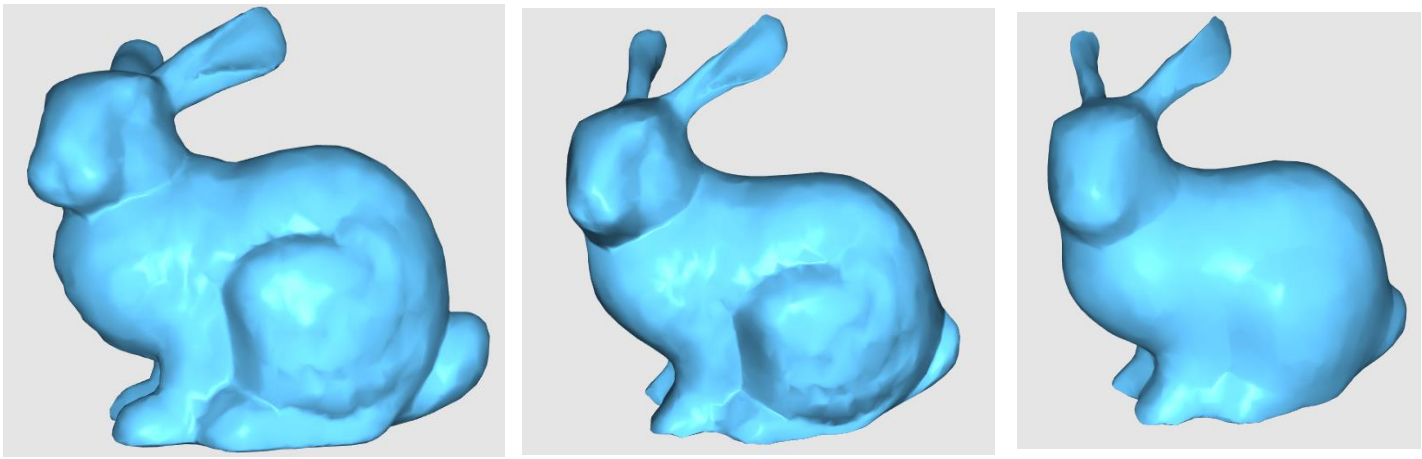


b) Implicit Umbrella Smooth:

Uniform-Weight Laplacian with the λ =1, iteration = 0, 20, 100



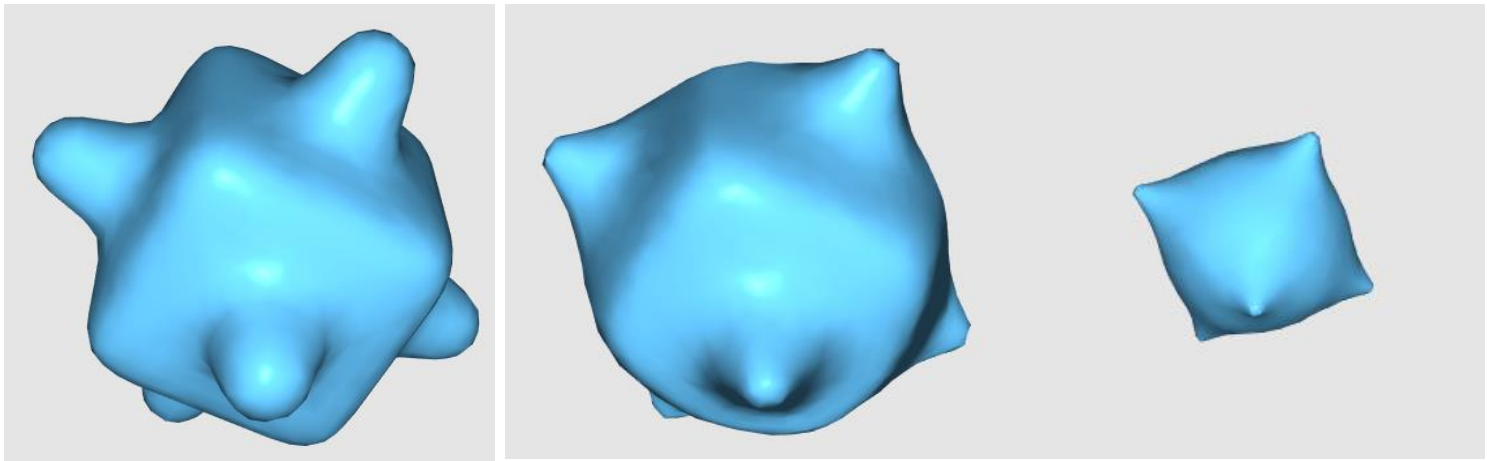
Cotangent-Weight Laplacian with the λ = 1, iteration i = 0, 10, 15



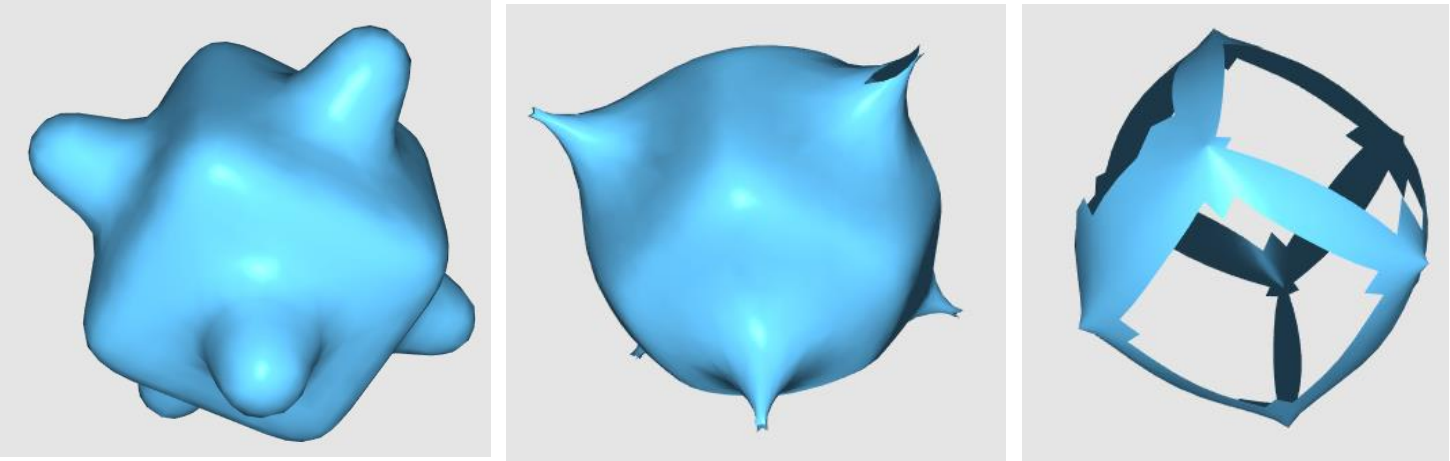
Test-case mesh: cube_bumpy.obj

a) Explicit Umbrella Smooth:

Uniform-Weight Laplacian with the λ = 0.9, iter = 0, 10, 100

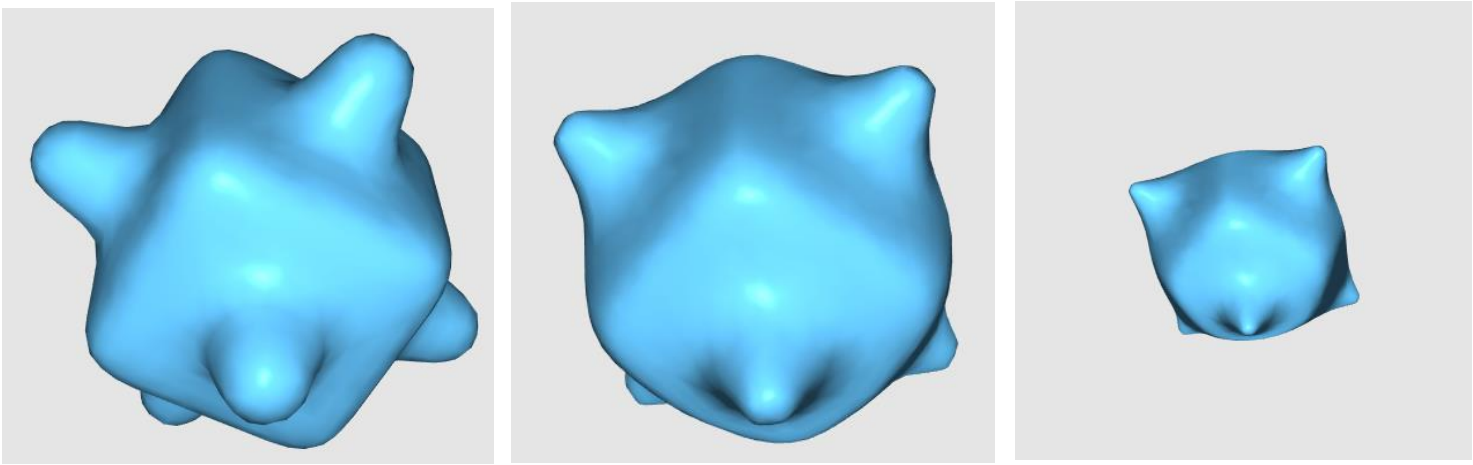


Cotangent-Weight Laplacian with the λ =0.9, iter = 0, 25, 40

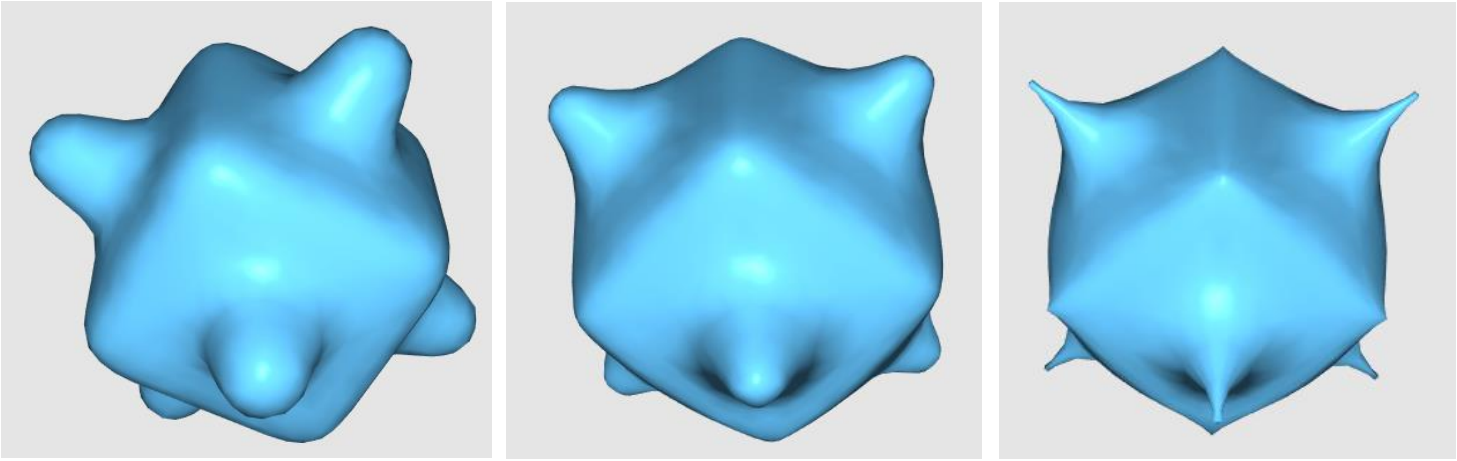


b) Implicit Umbrella Smooth:

Uniform-Weight Laplacian with the λ =1, iteration = 0, 10, 100



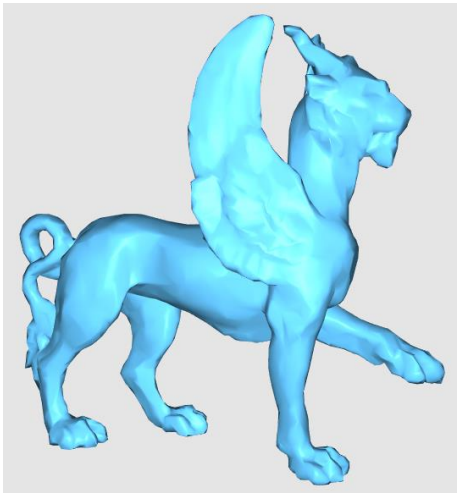
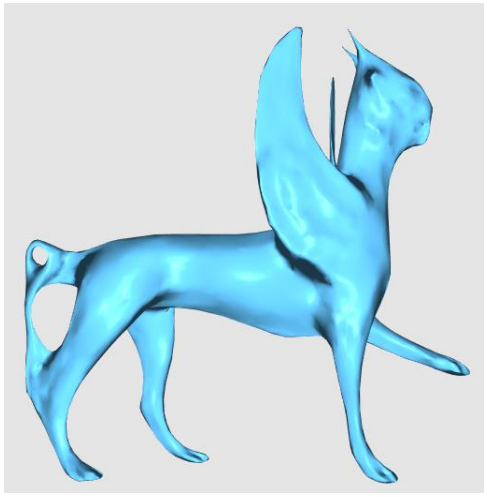
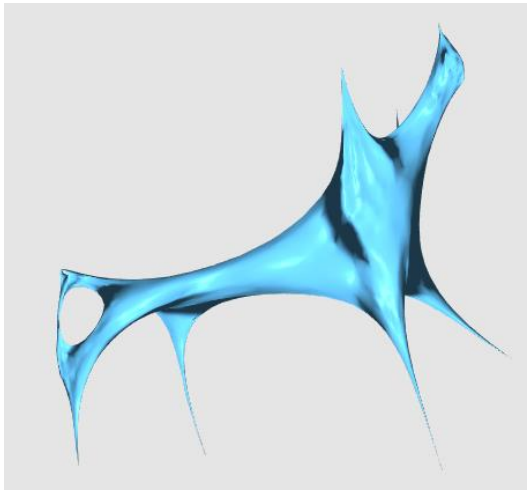
Cotangent-Weight Laplacian with the λ =1, iteration = 0, 10, 50



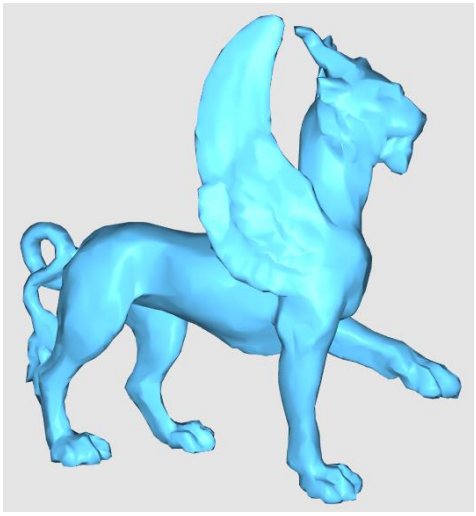
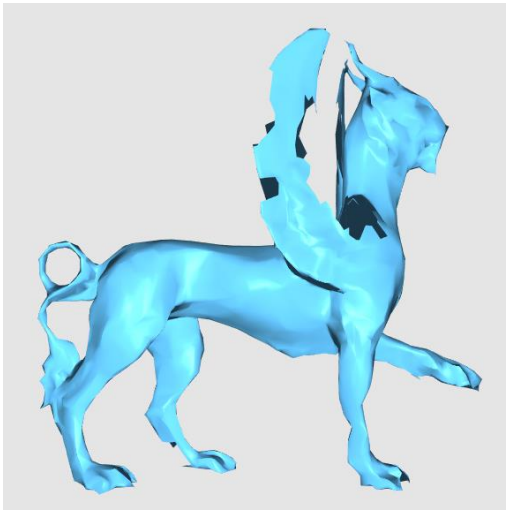
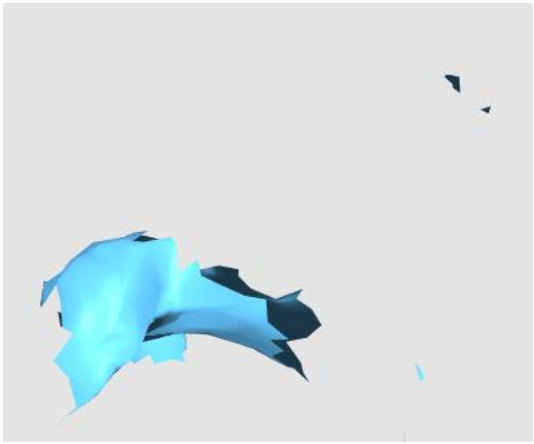
Test-case mesh: feline.obj

a) Explicit Umbrella Smooth:

Uniform-Weight Laplacian with the λ = 0.9, iter = 0, 10,100

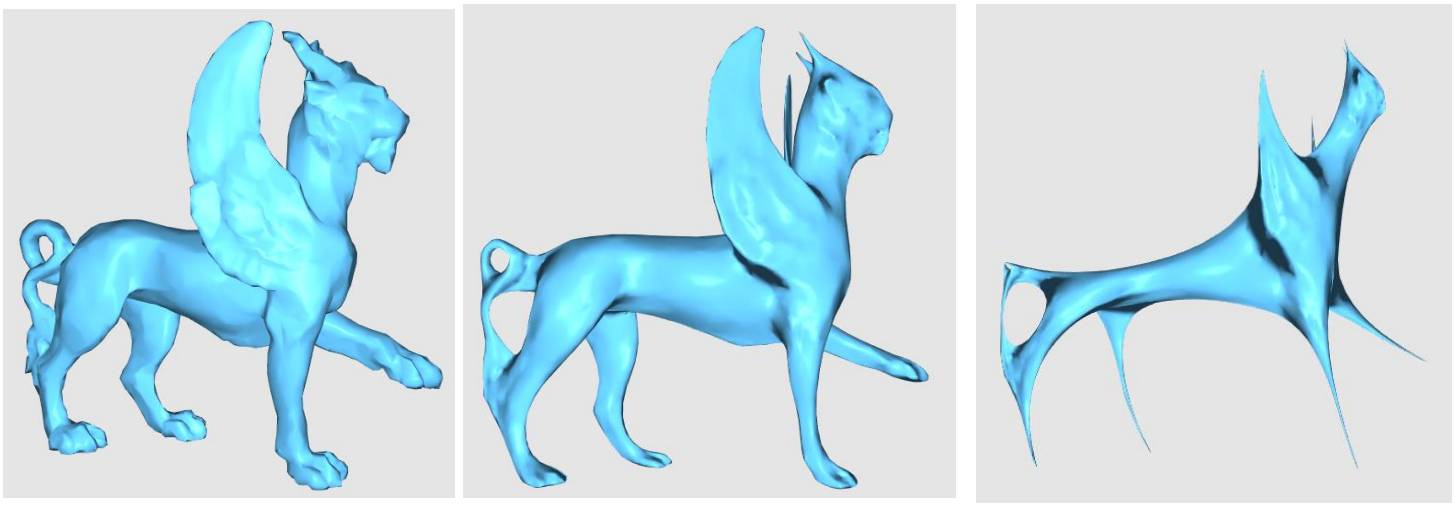




Cotangent-Weight Laplacian with the λ =0.9, iter = 0, 10, 20

b) Implicit Umbrella Smooth:

Uniform-Weight Laplacian with the λ =1, iteration = 0, 10, 100



Cotangent-Weight Laplacian with the λ =1, iteration = 0, 5, 10

2) Conclusion on the smoothing part

a) Implicit Smooth is better to keep the skeleton than Explicit Smooth.

b) Smooth with cotangent-weight is better to keep the skeleton than that with uniform-weight.

c) The larger λ and the larger number of iterations will result in a smoother output.

d) For completing one update, Explicit Smooth is much faster than the Implicit Smooth. However, with the update times increase, Implicit Smooth will take less time than Explicit Smooth.

e) If we repeat the smoothing too much times, the model will converge into one single point.