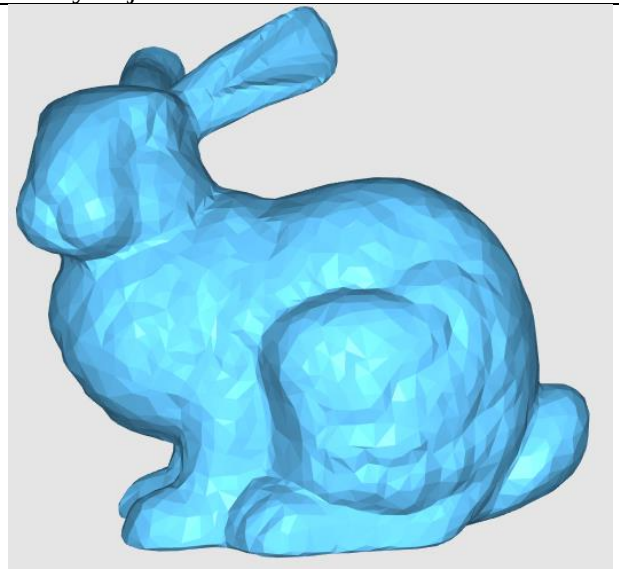
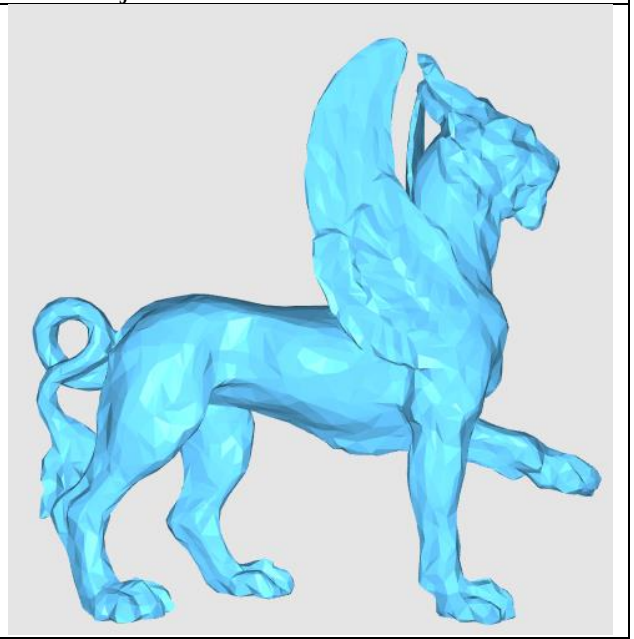
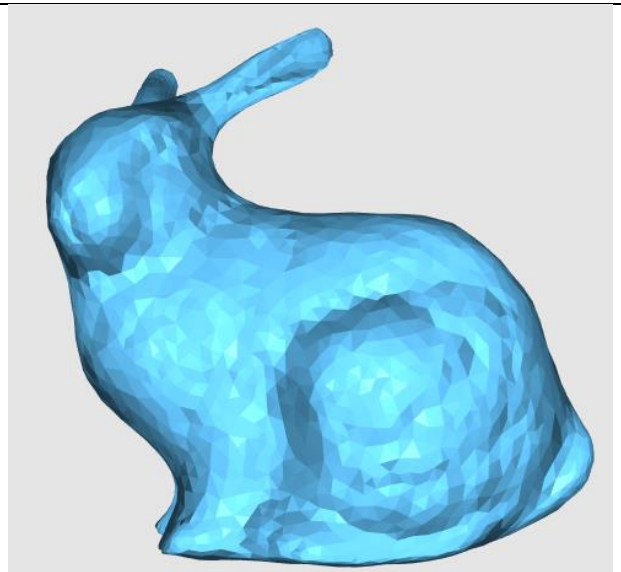
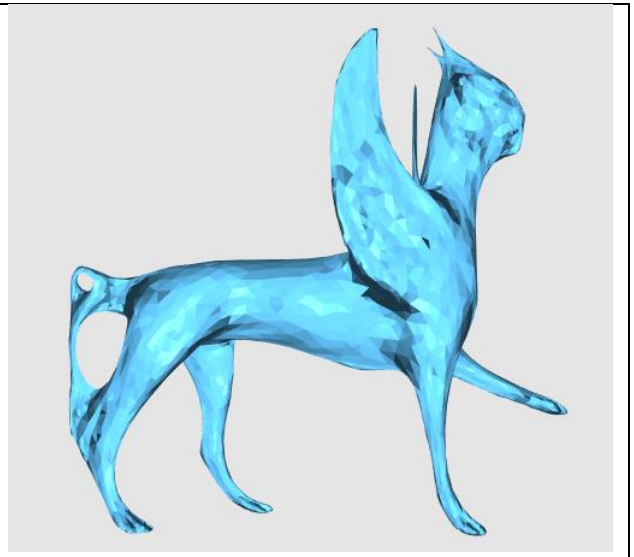
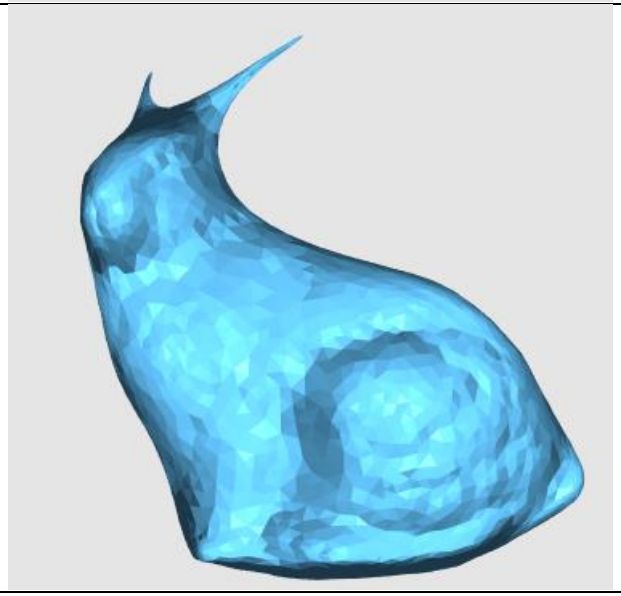
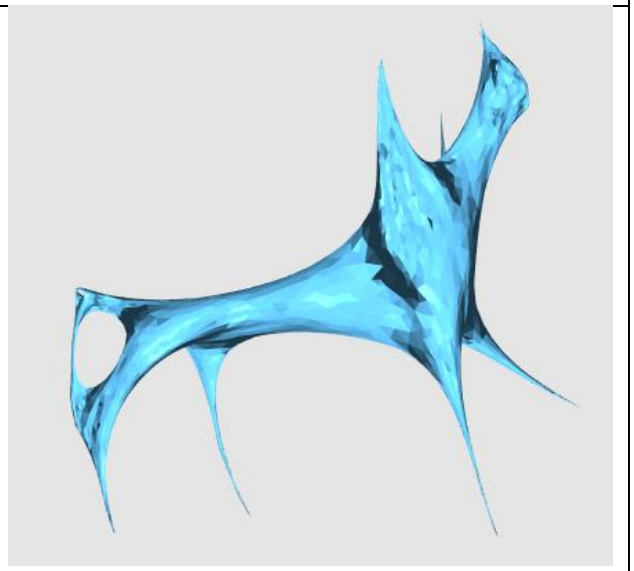
1. Describe briefly the explicit and implicit smoothing methods, assuming uniform weighting. Describe using your own words, no equations needed. (˜4 sentences)

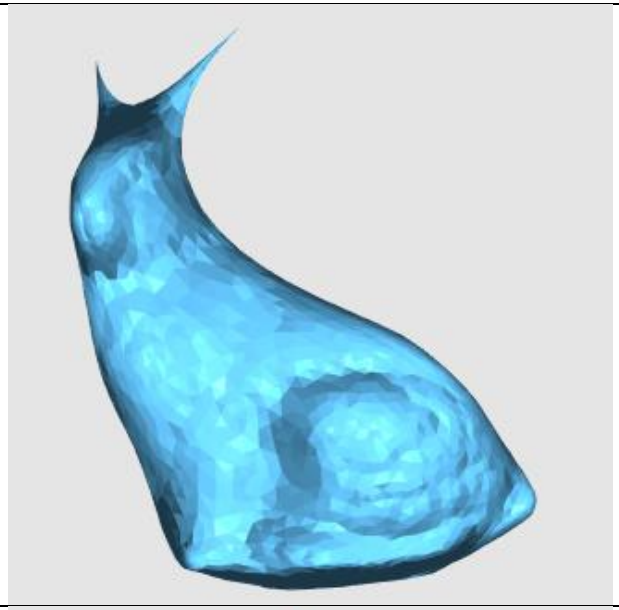
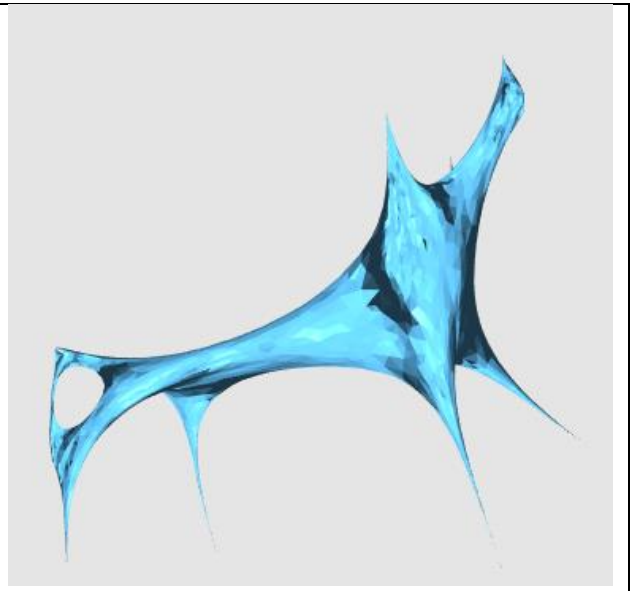
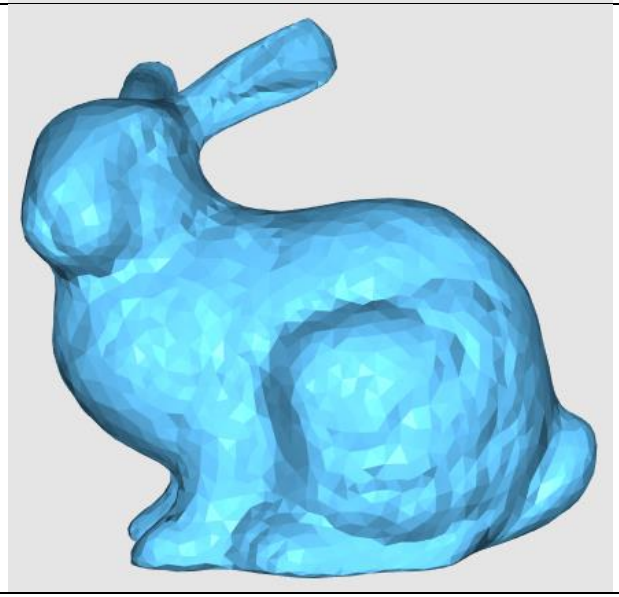
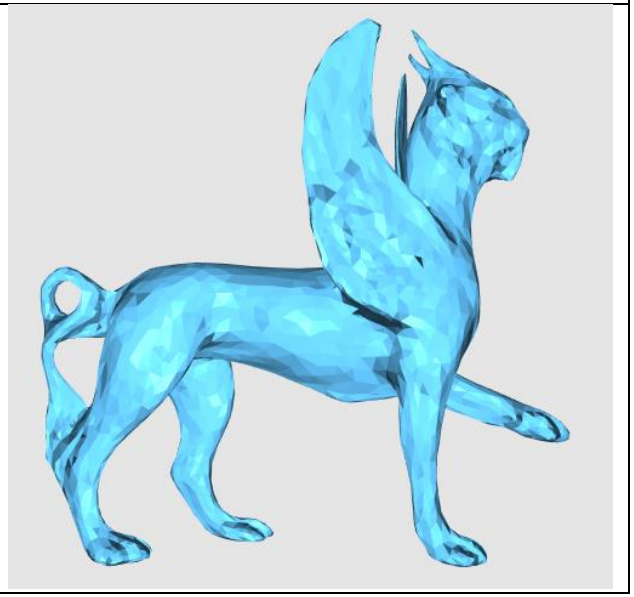
   Explicit laplacian smoothing involves moving each vertex of the model to the average position of its neighboring vertices. Implicit laplacian smoothing uses a mathematical function to smooth the surface of the model, which preserves sharp edges and details better than explicit Laplacian smoothing.

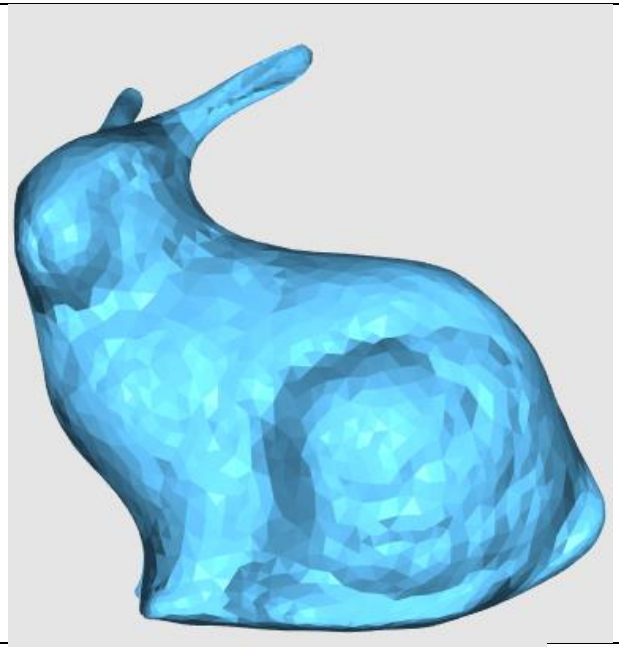
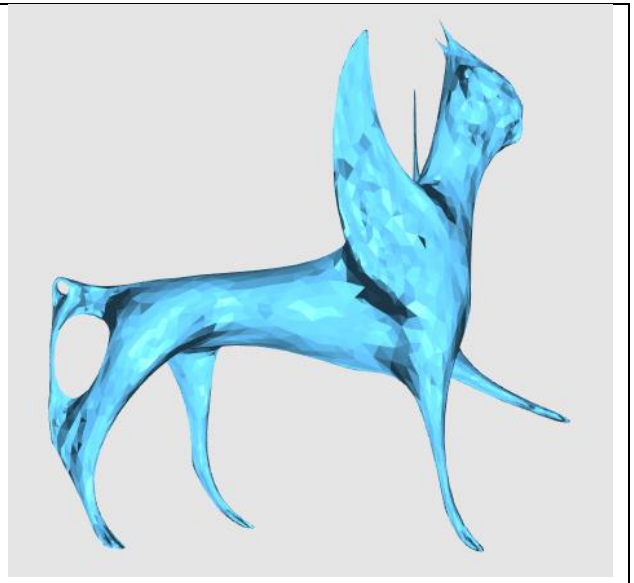
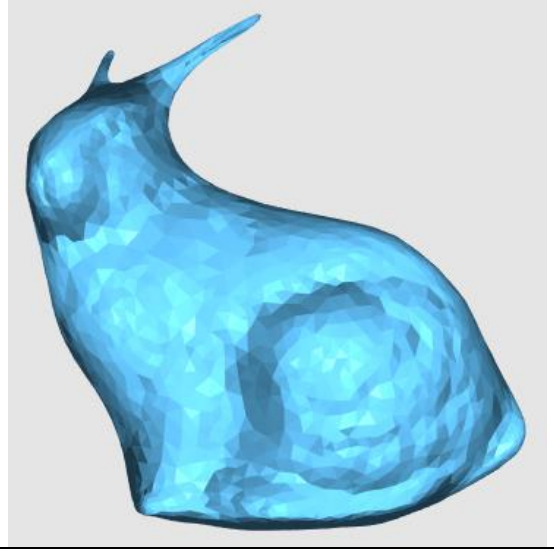
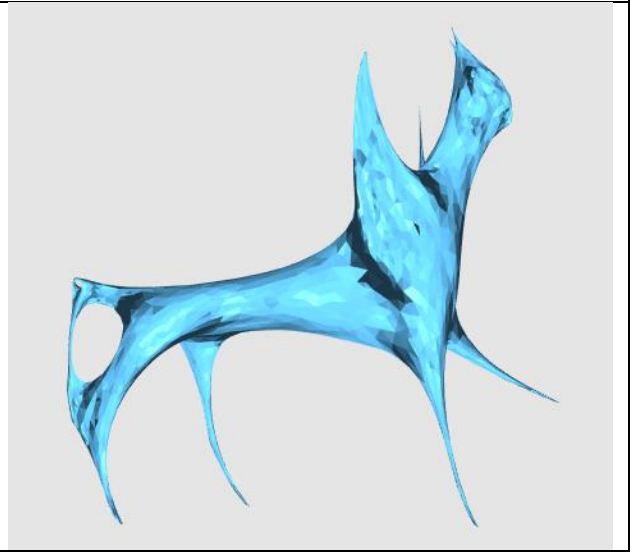
2. Screenshot

   – Explicit method with uniform weighting (bunny.obj, feline.obj): (1) Fix $\lambda = 1$, vary the number of iterations (3 values); (2) Fix number of iterations, vary $0 < \lambda \leq$ (3 values)

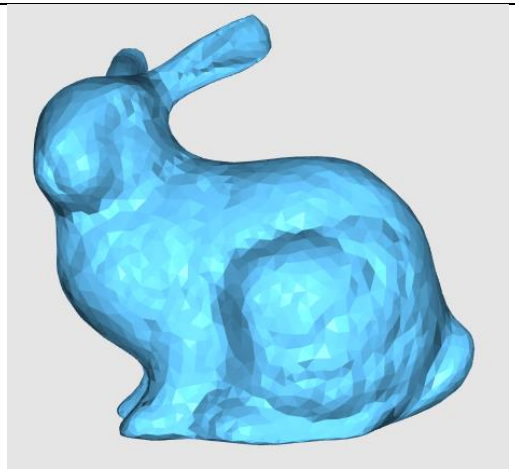
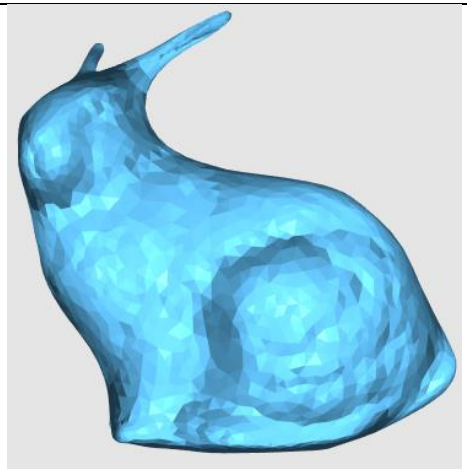
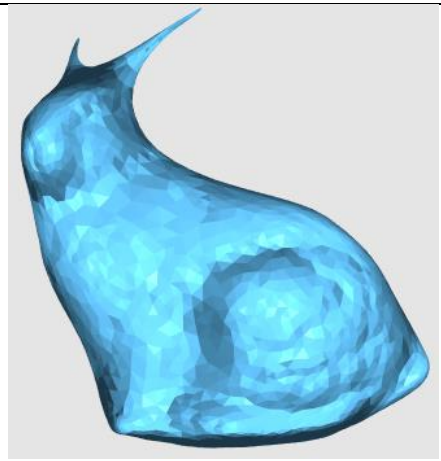
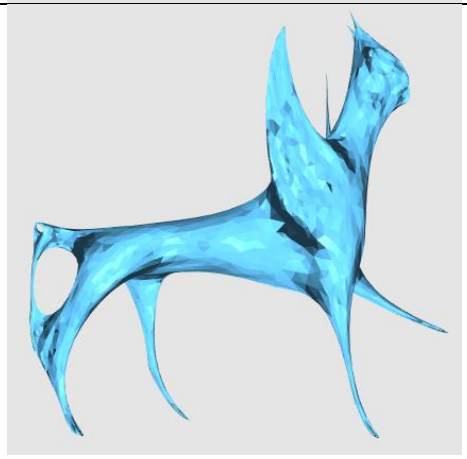
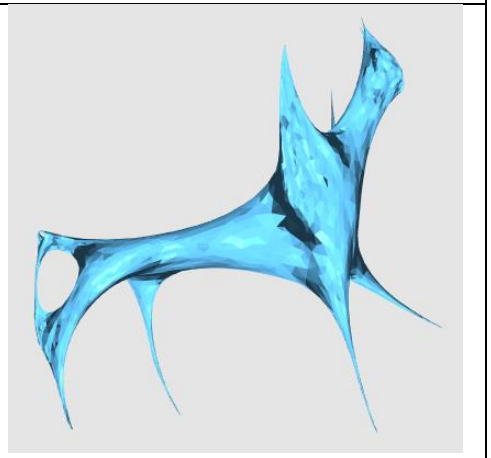
λ	Iter_num	bunny.obj	feline.obj
-	-		

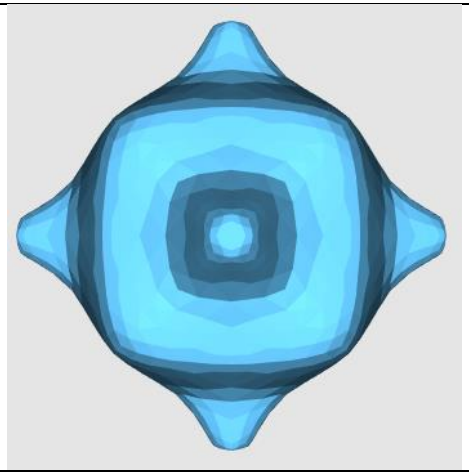
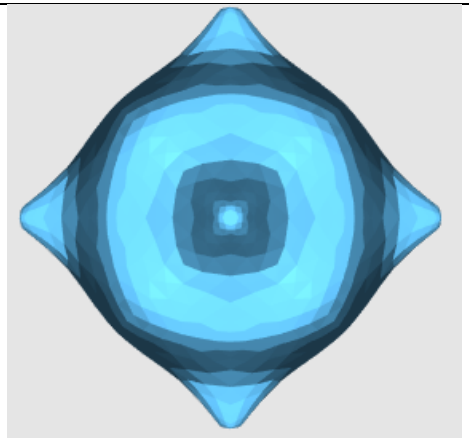
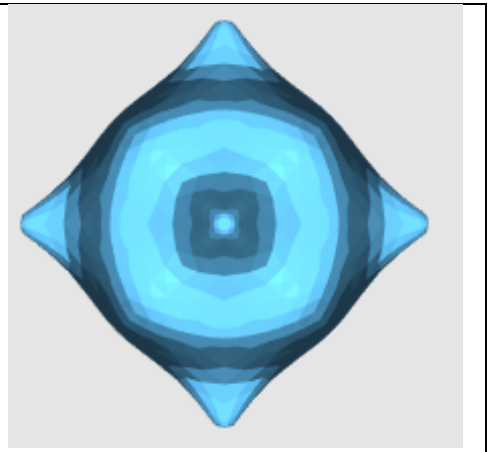
1	10		
1	50		

1	100		
0.1	50		

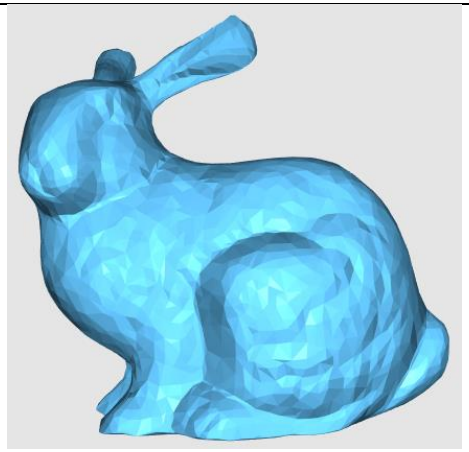
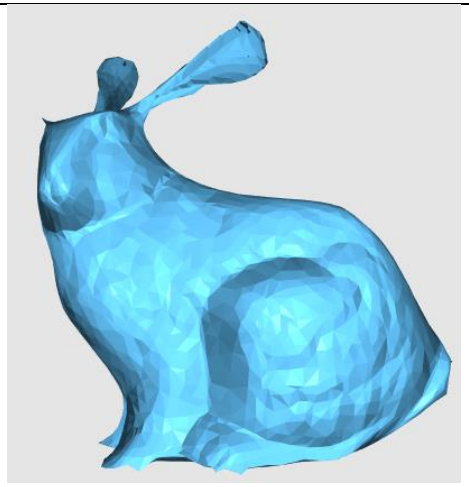
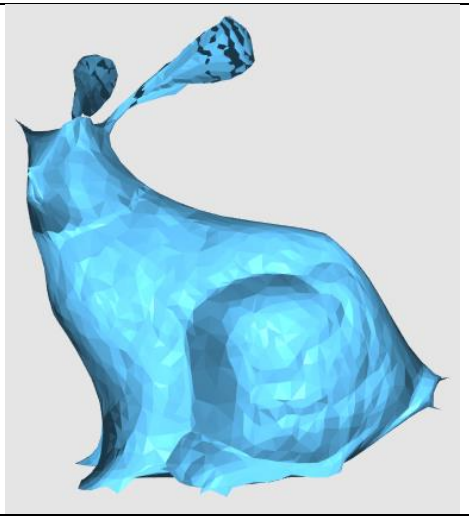
0.5	50		
0.8	50		

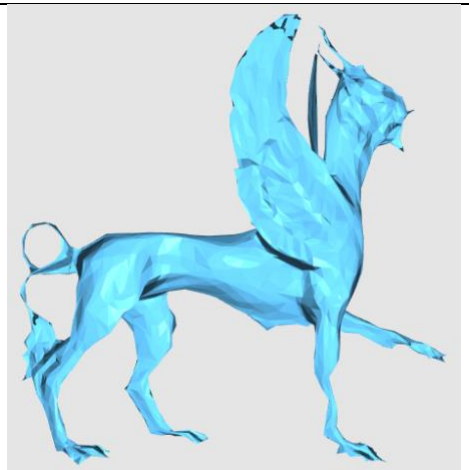
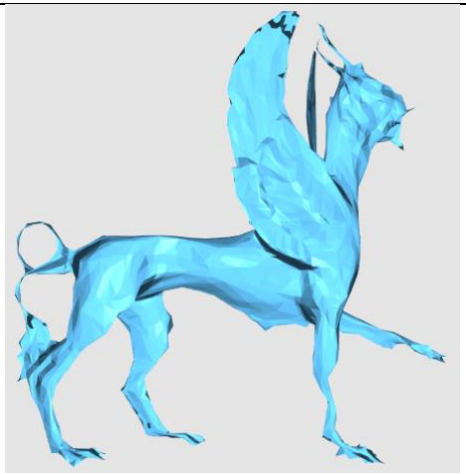
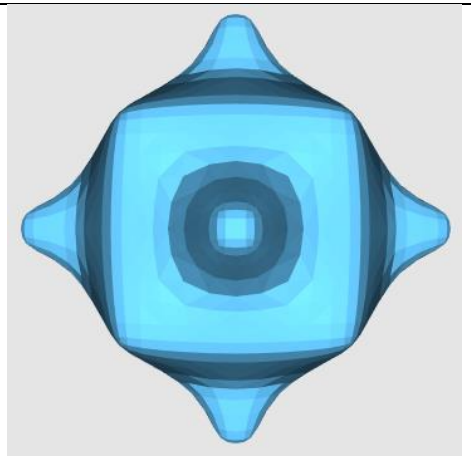
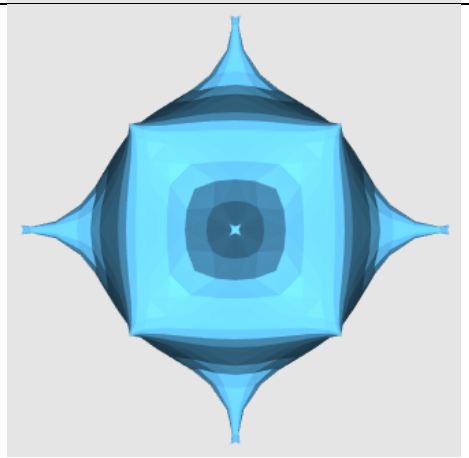
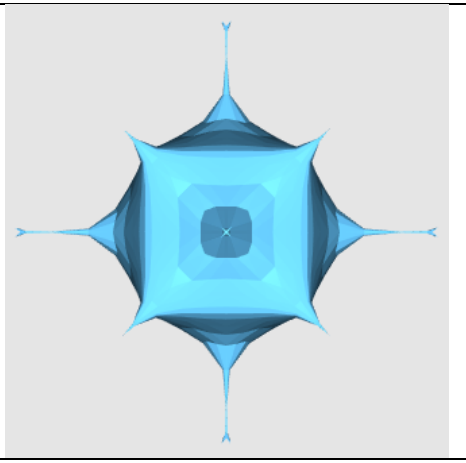
– Implicit method with uniform weighting (bunny.obj, feline.obj, cube bumpy.obj): Fix λ = 1, vary number of iterations (3 values)

Iter_num	10	50	100
bunny.obj			
feline.obj			

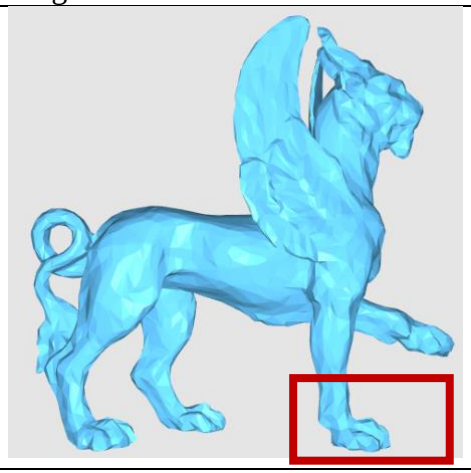
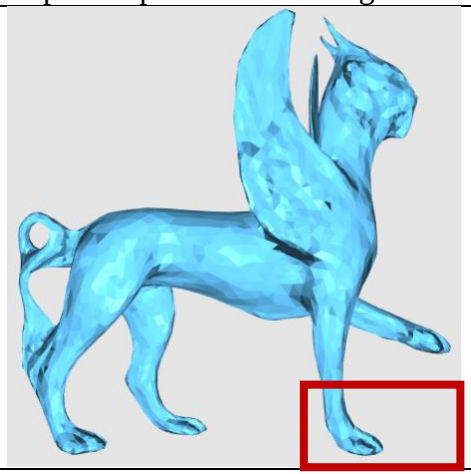
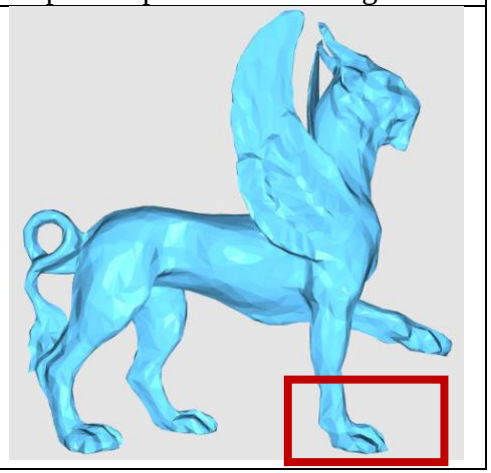
cube bumpy.obj			

– Implicit method with co-tangent weighting (bunny.obj, feline.obj, cube bumpy.obj): fix $\lambda = 1$, vary number of iterations (3 values)

Iter_num	10	50	100
bunny.obj			

feline.obj			
cube bumpy.obj			

3. Briefly compare and contrast the two methods and the two weighting schemes, referring to the screenshots wherever appropriate (˜4 sentences)

λ	Iter_num	Original	Explicit laplacian smoothing	Implicit laplacian smoothing
0.5	10			

Explicit laplacian smoothing method can lead to a loss of detail and sharp edges, whereas implicit laplacian smoothing method preserves sharp edges and details better than explicit Laplacian smoothing. From the marked area in the above images, we can see that after explicit laplacian smoothing, the toes of the feline become so smooth that we cannot see the joints anymore. Whereas after the implicit laplacian smoothing, the joints on toes can still be seen though the toes are smoothened.