

**CS6630** Realistic Image Synthesis

# Differentiable rendering

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Fall 2022





Luan et al. EGSR 2021









(a) Reference images



(b) Optimized surface



(c) Optimization result



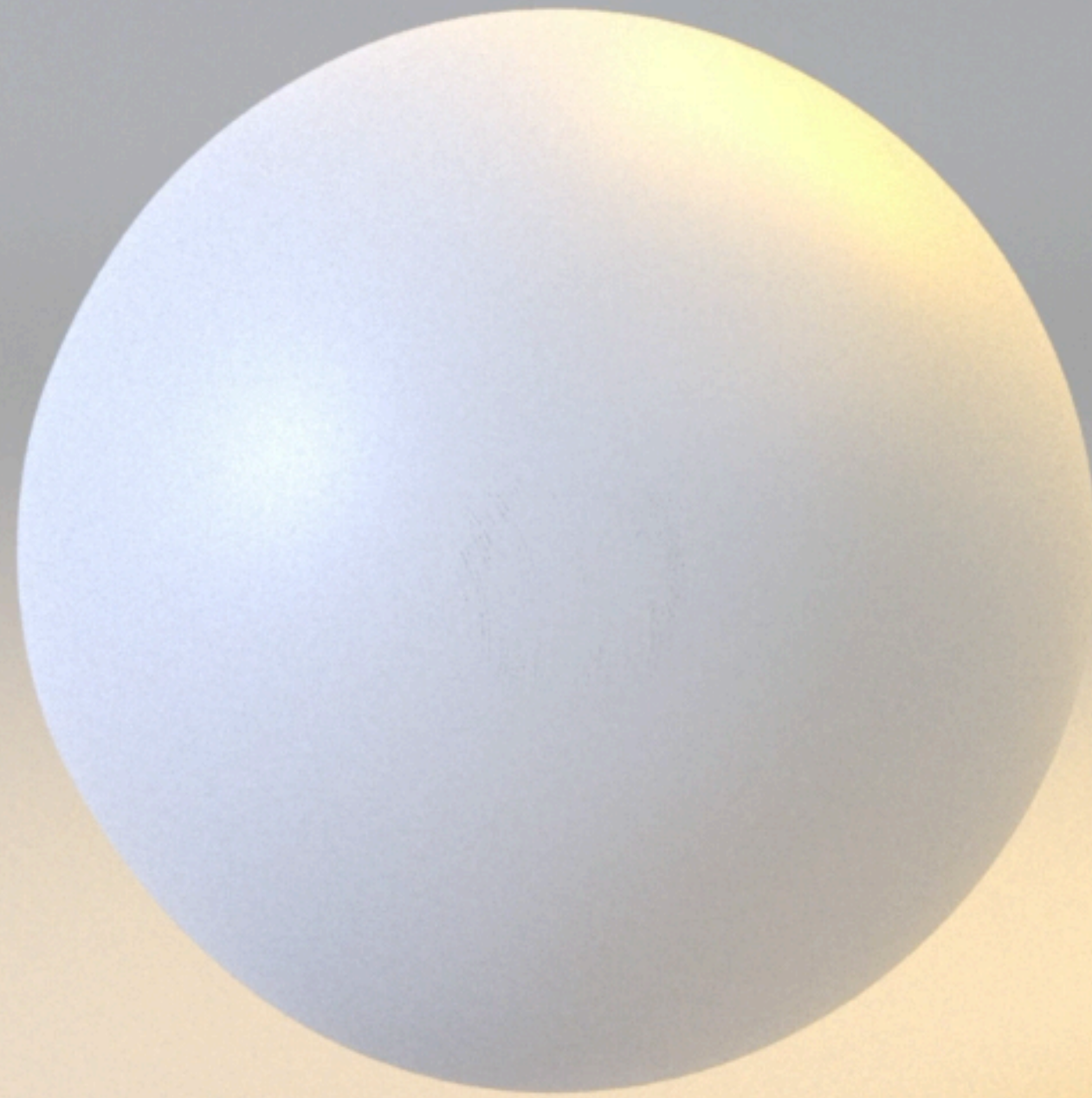
(d) Ground truth





# Optimization

Optimizing shape, albedo  
& roughness



Iteration 0



# Differentiable rendering overview

## Computing derivatives

- finite differences
- symbolic differentiation
- automatic differentiation
- reverse mode AD

## Differentiating integrals

- Continuous case
- Accounting for discontinuities

## Tzu-Mao Li et al.

- explicit edge sampling
- forward path tracing

## Nimier-David et al.

- reparameterization
- forward path tracing

## Cheng Zhang et al.

- path space formulation
- explicit edge sampling