



# Estimation and Visualization of Isosurface Uncertainty from Linear and High-Order Interpolation Methods

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SCI Institute, University of Utah

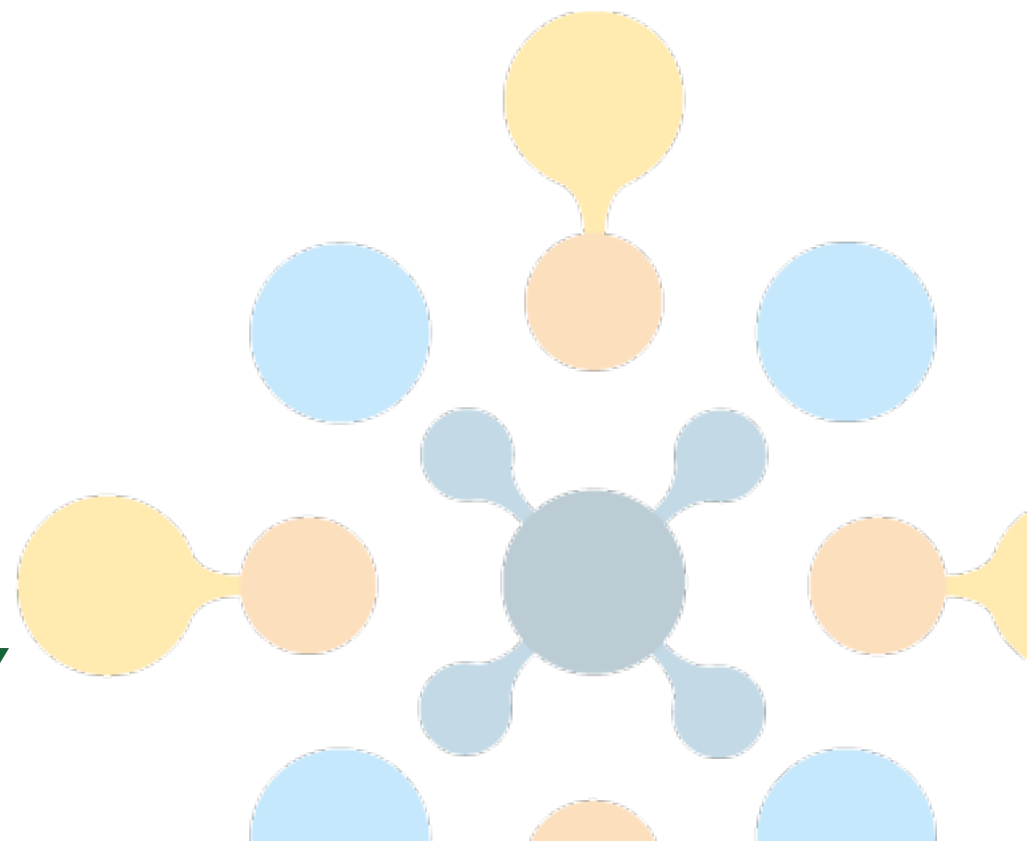
Jixian Li  
SCI Institute, University of Utah

Tushar M. Athawale  
Oak Ridge National Laboratory

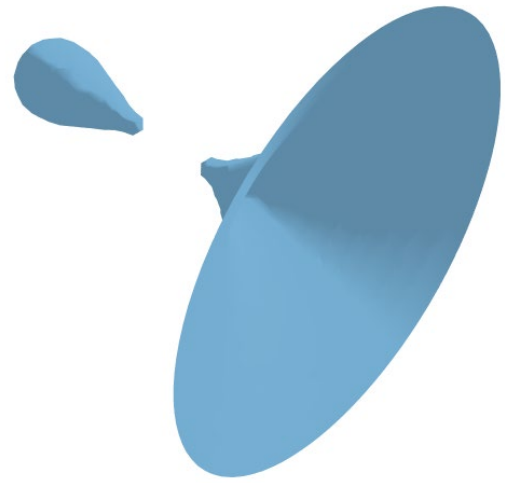
Chris R. Johnson  
SCI Institute, University of Utah



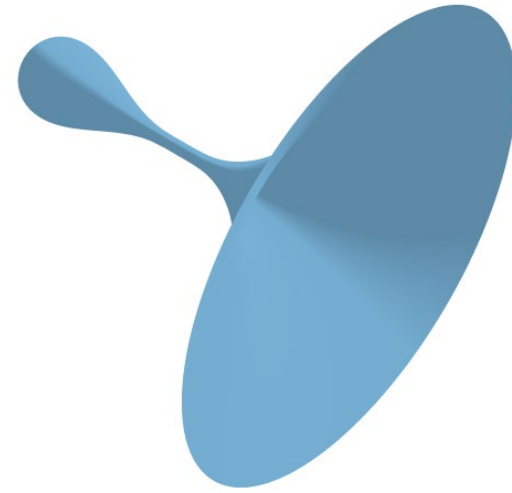
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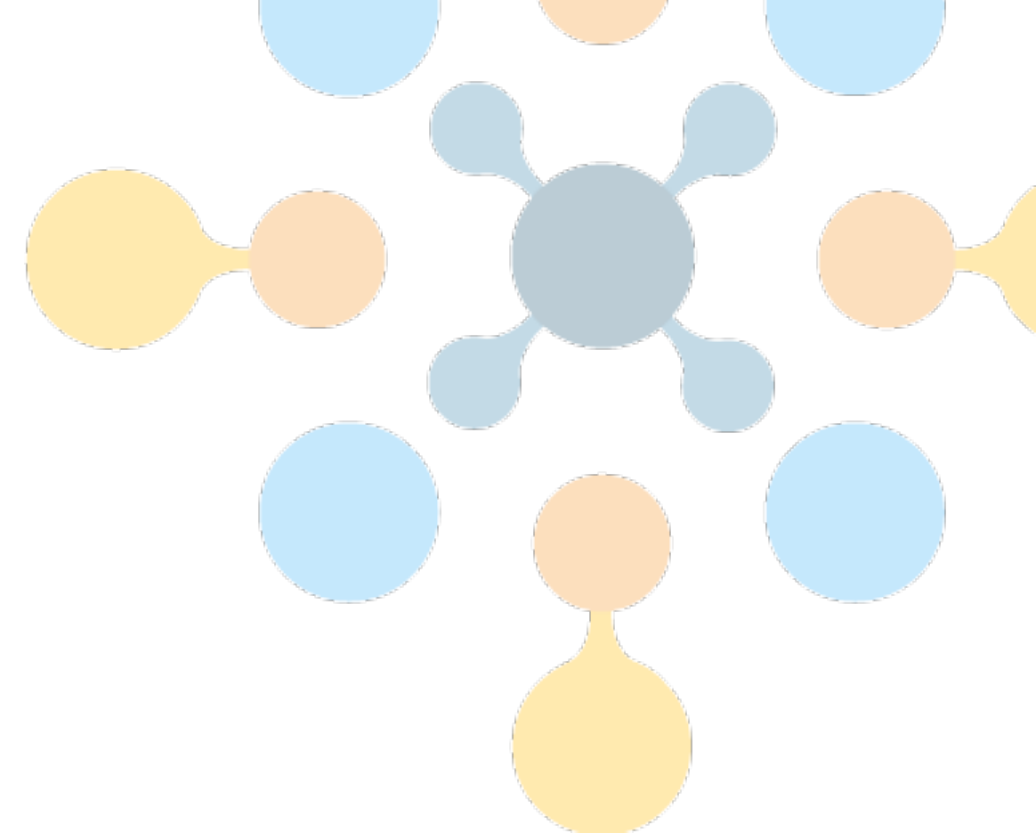
# Teardrop



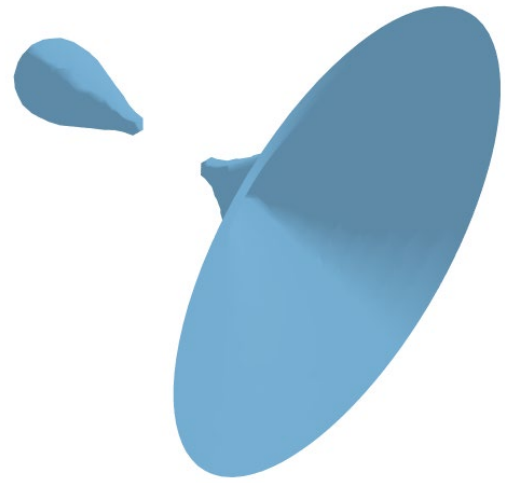
Marching Cubes (MC)



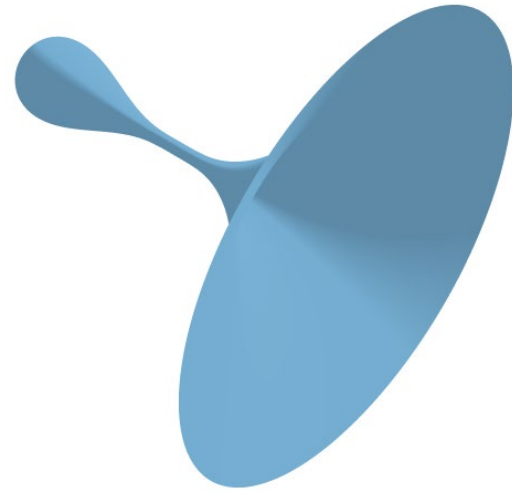
Target



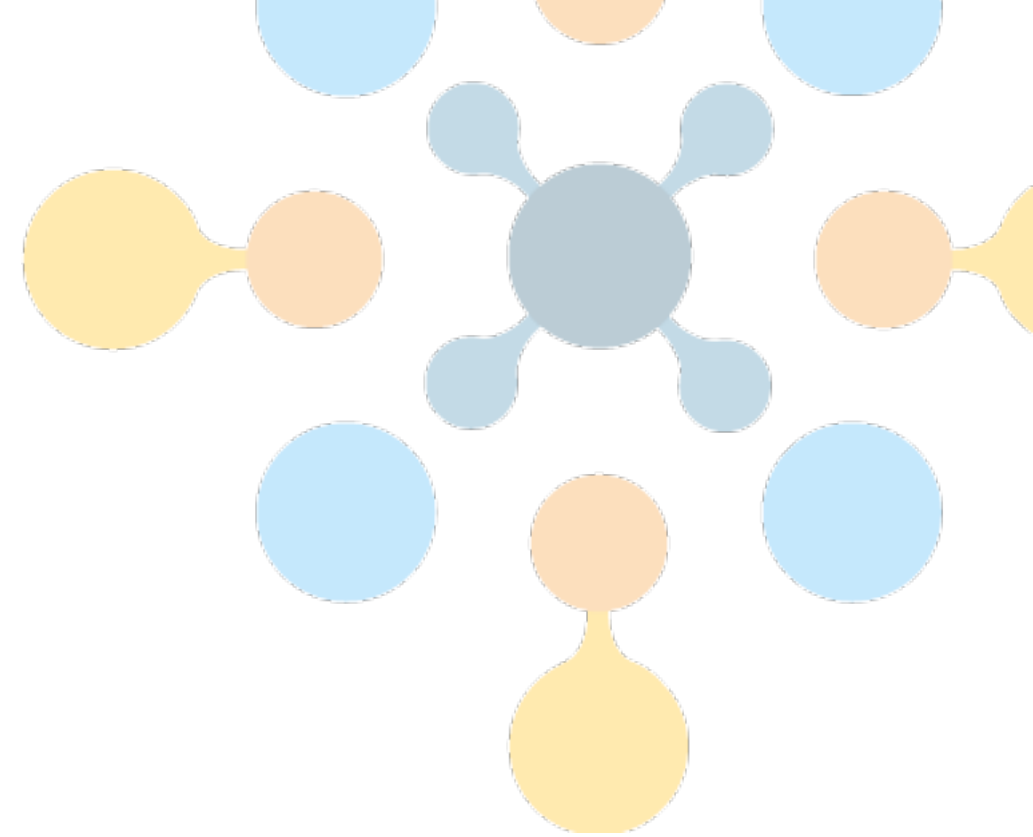
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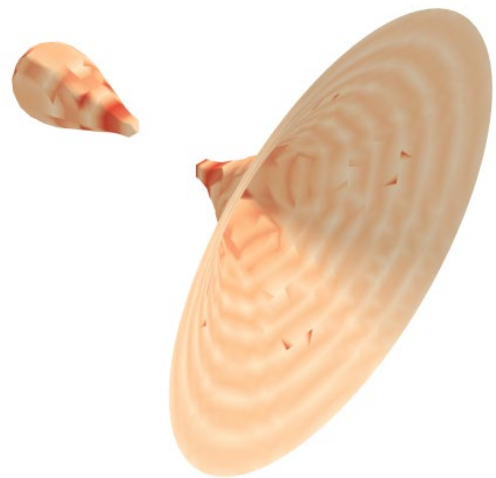
Marching Cubes (MC)



Target

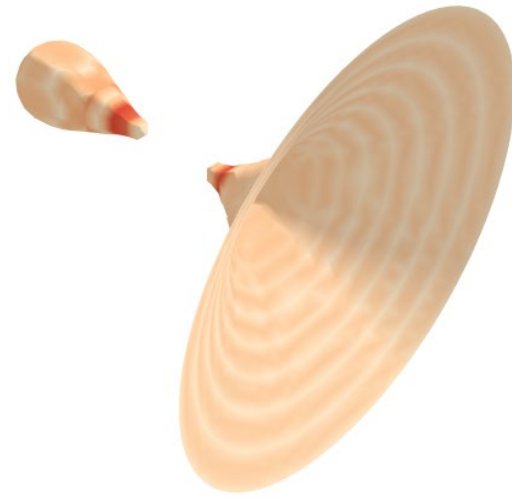


Edge Crossing Error



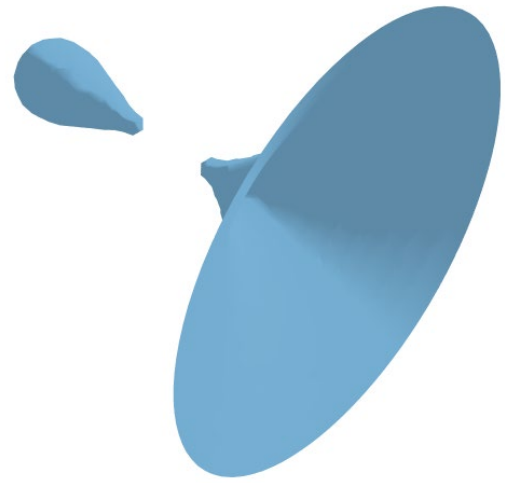
Estimated Errors

Edge Crossing Error

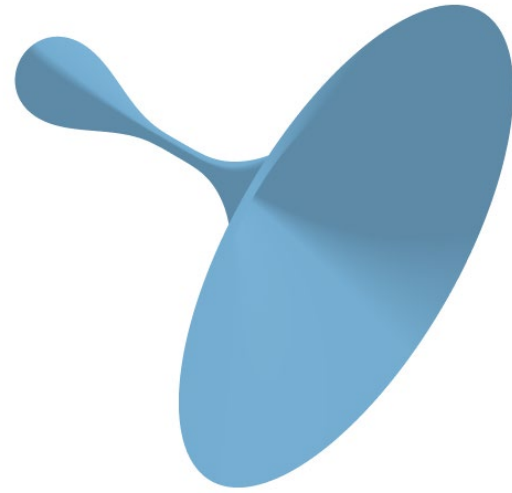


Measured Errors

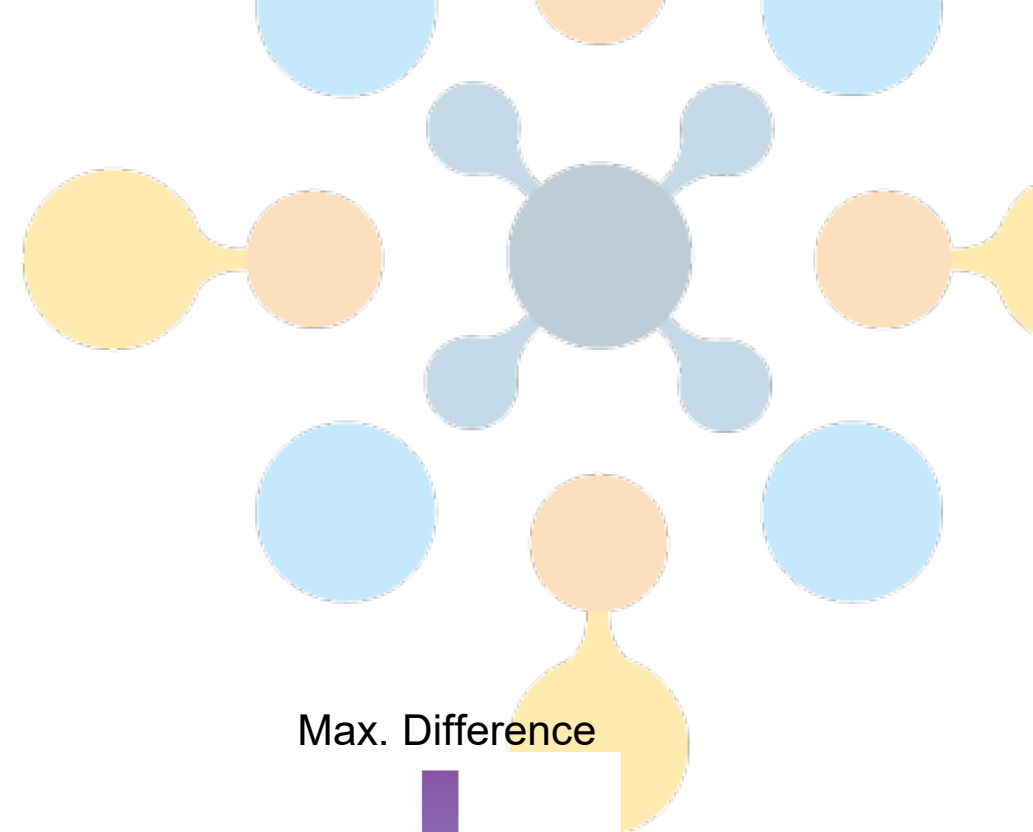
# Teardrop



Marching Cubes (MC)

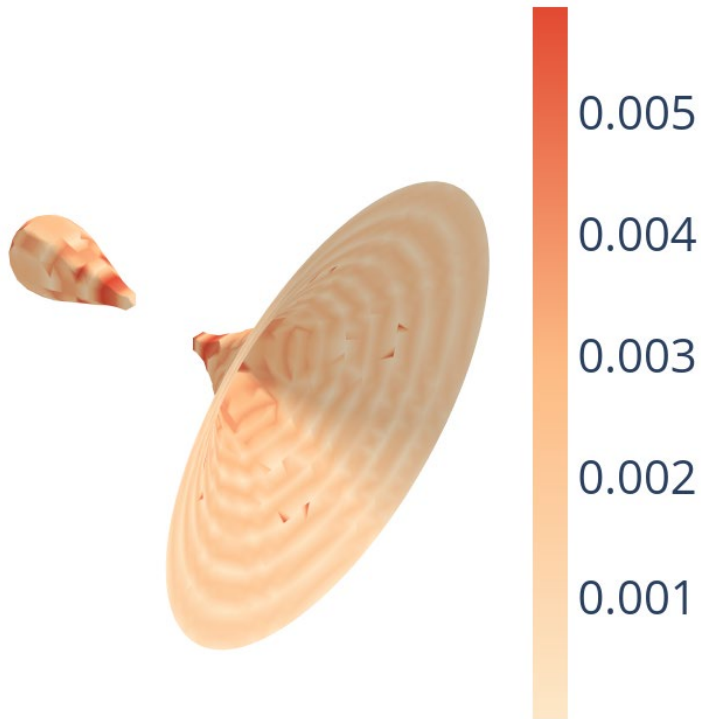


Target



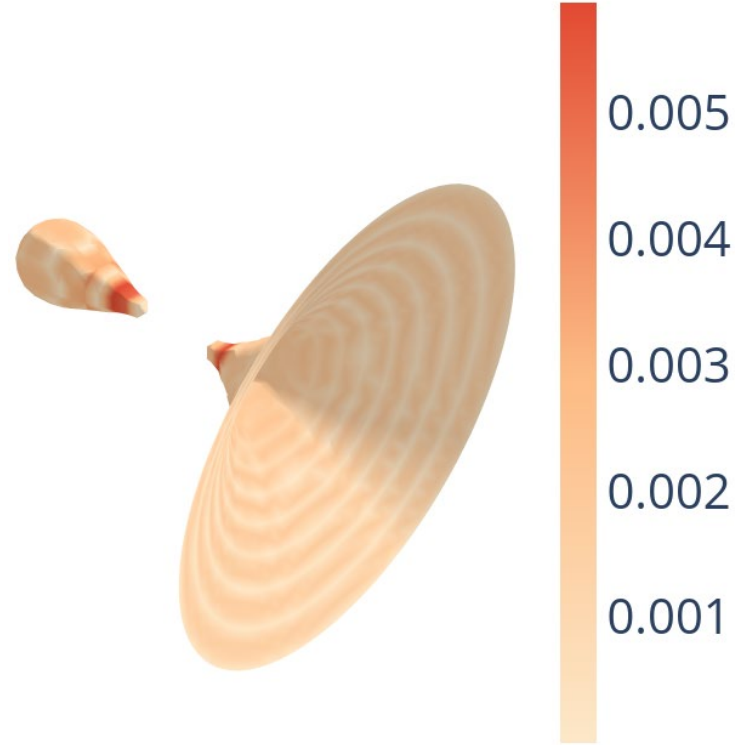
Max. Difference

Edge Crossing Error



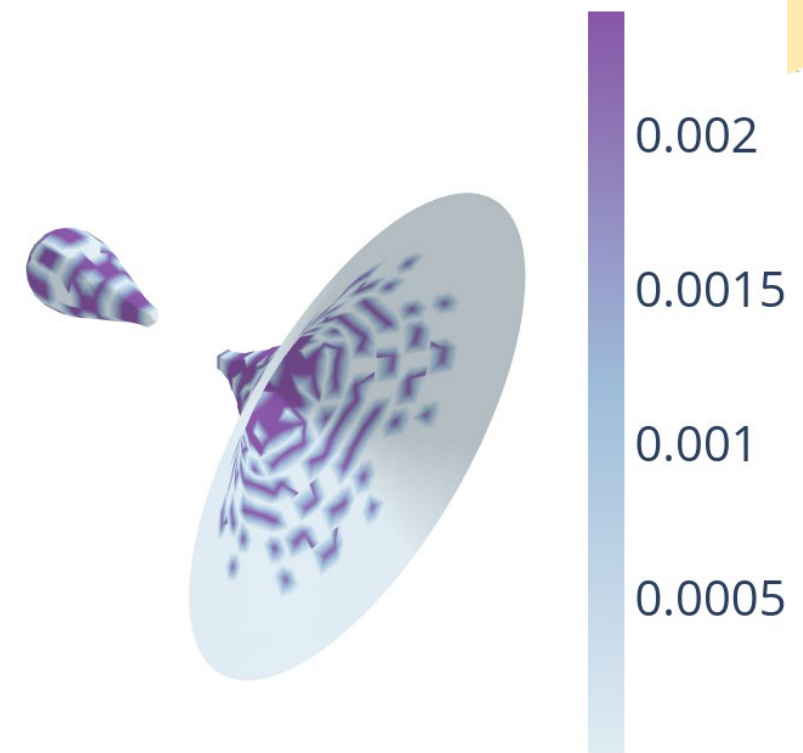
Estimated Errors

Edge Crossing Error



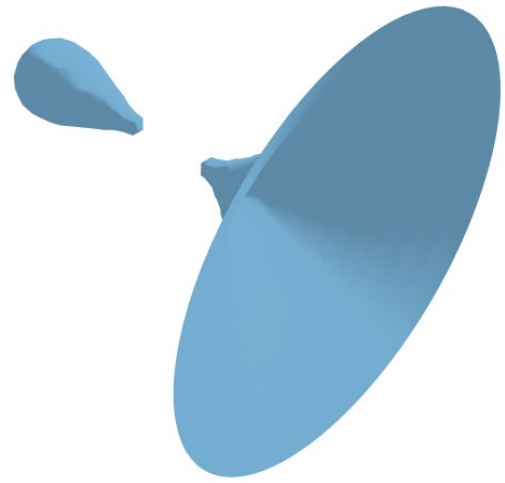
Measured Errors

Max. Difference

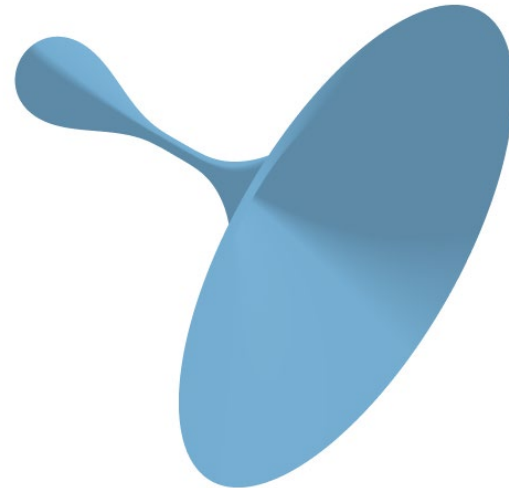


Interpolation Methods Max. Variation

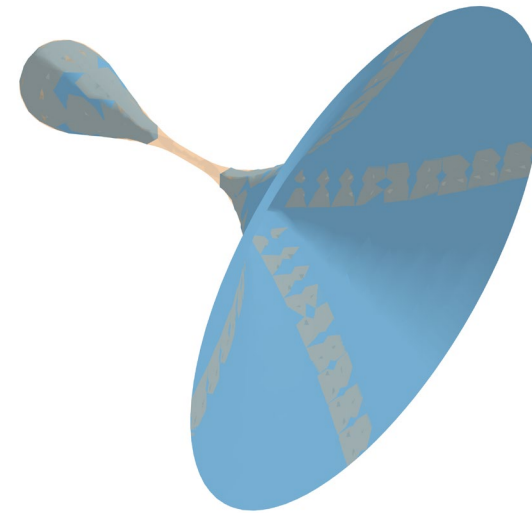
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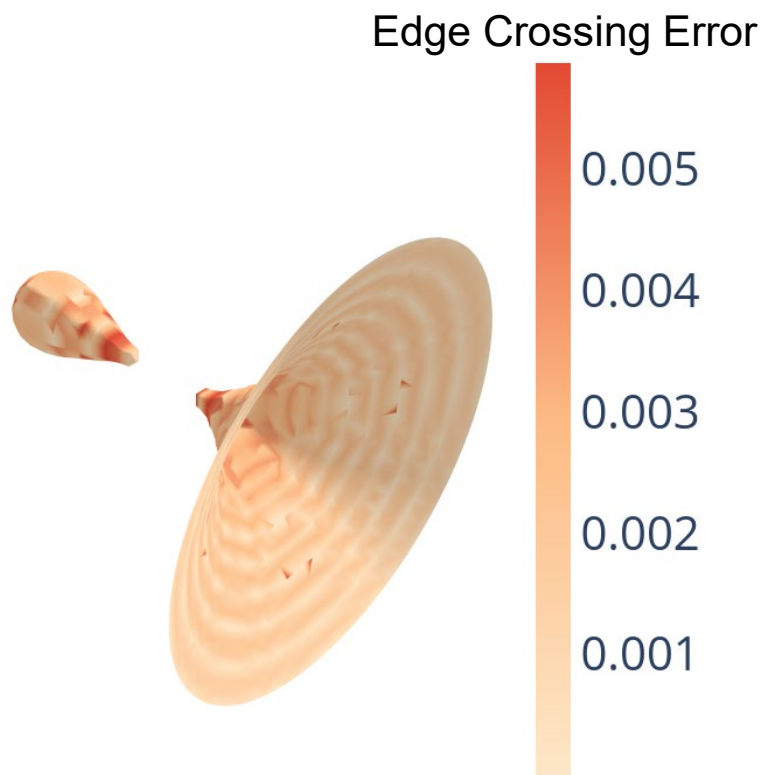
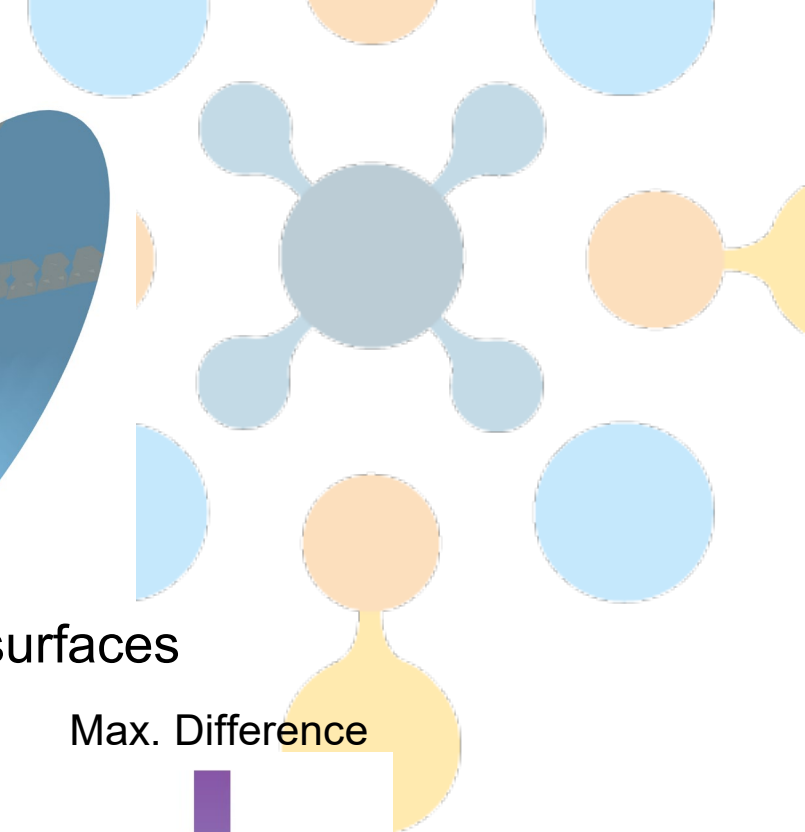
Marching Cubes (MC)



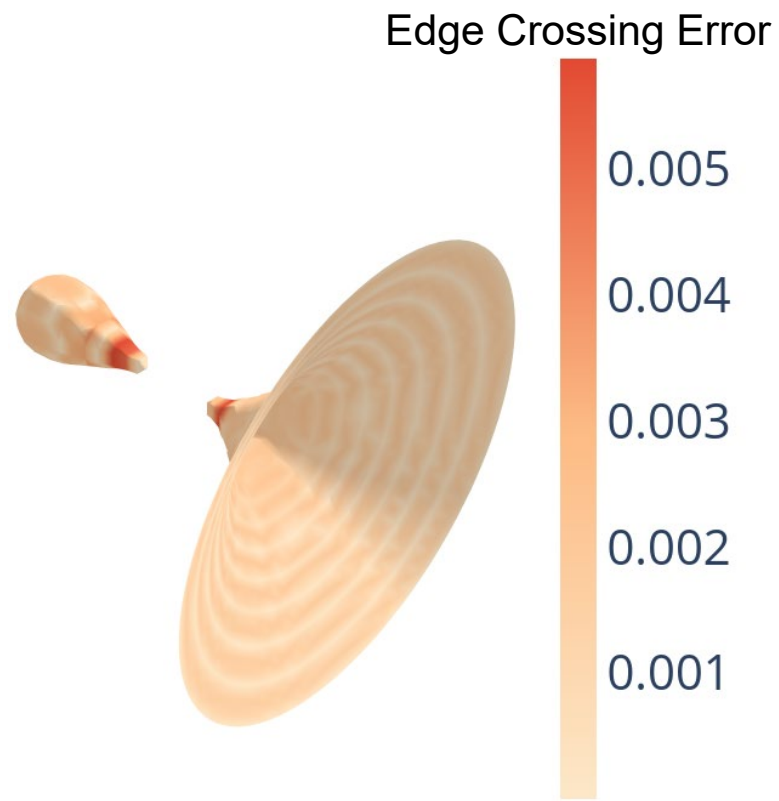
Target



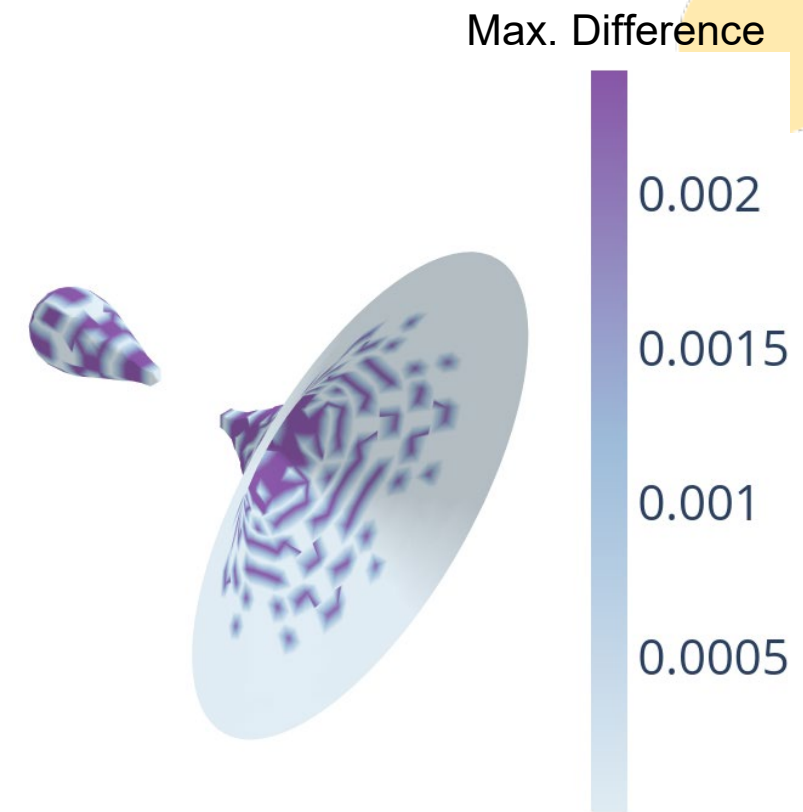
Possible Isosurfaces



Estimated Errors

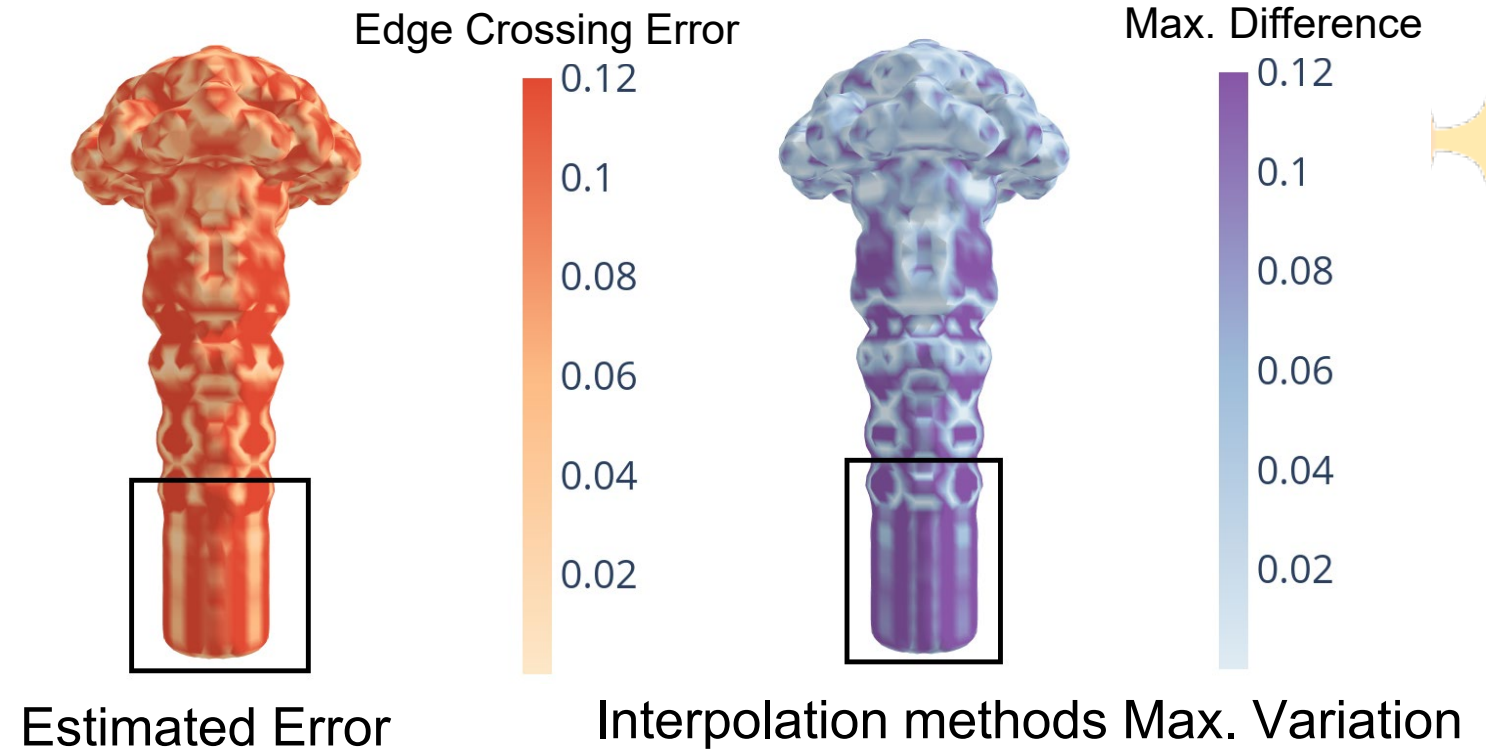


Measured Errors



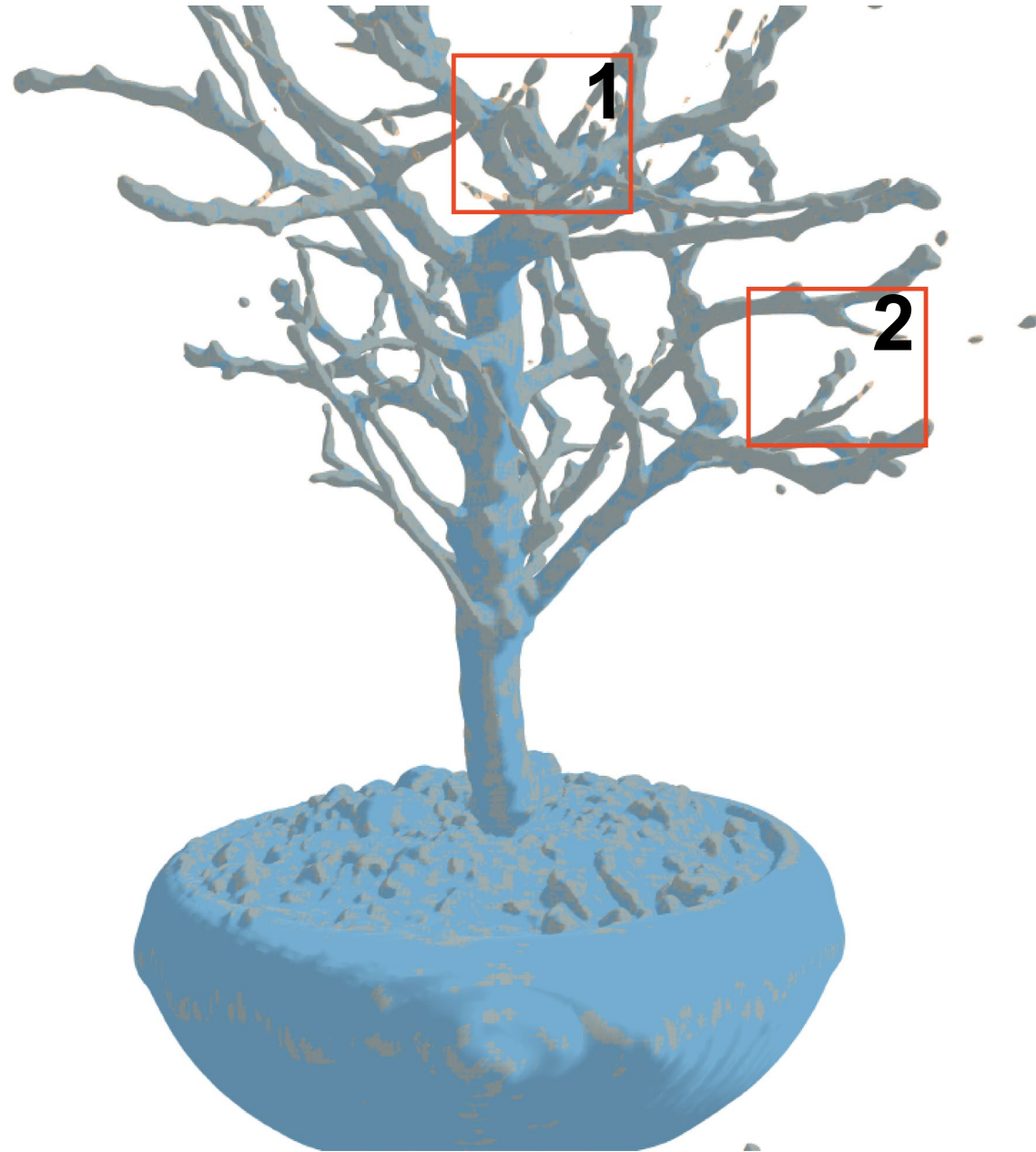
Interpolation Methods Max. Variation

# Fuel

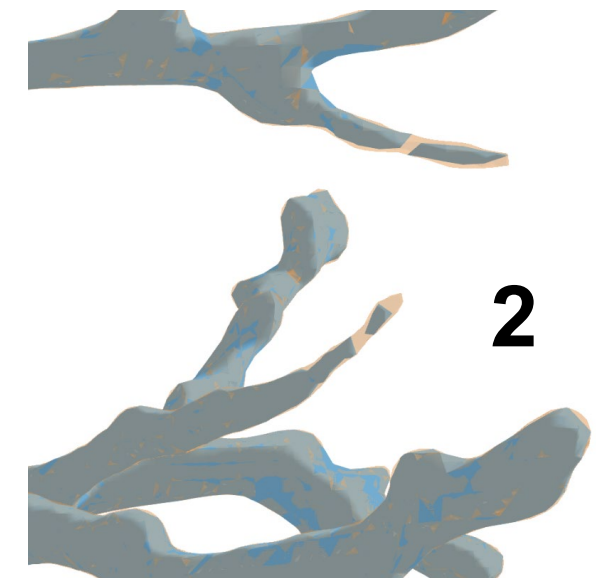
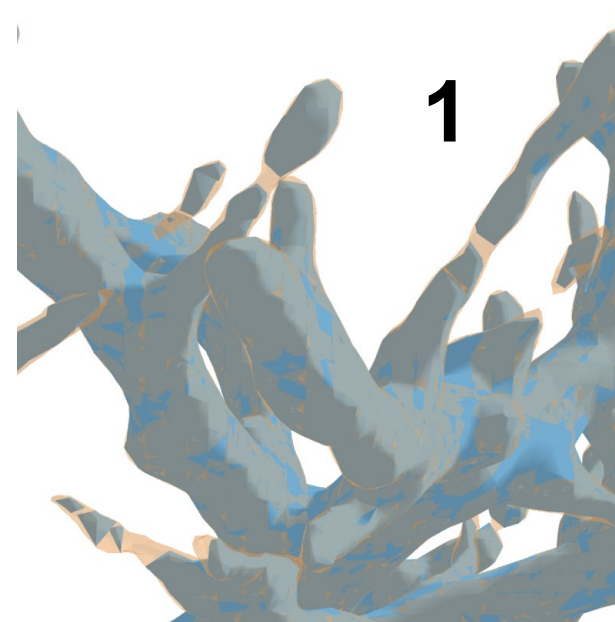
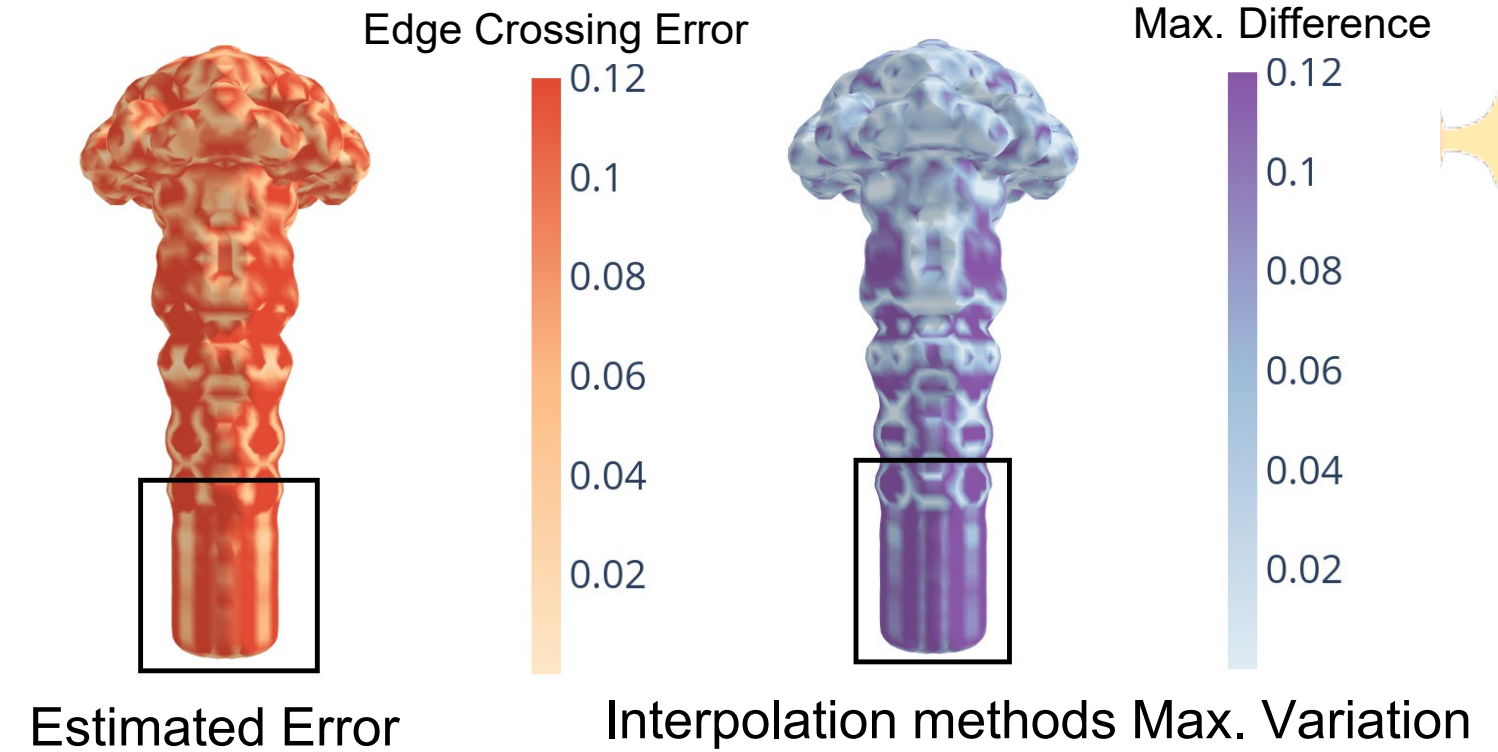




# Bonsai Tree



# Fuel



# Thank you

- **Acknowledgements**

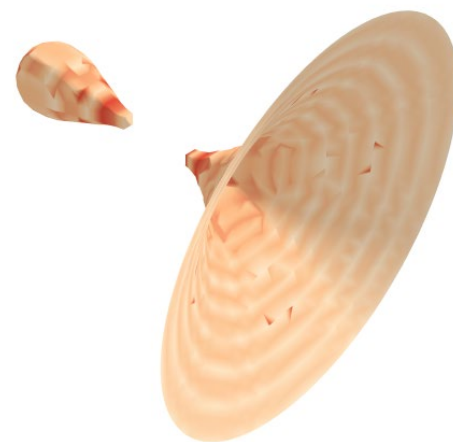
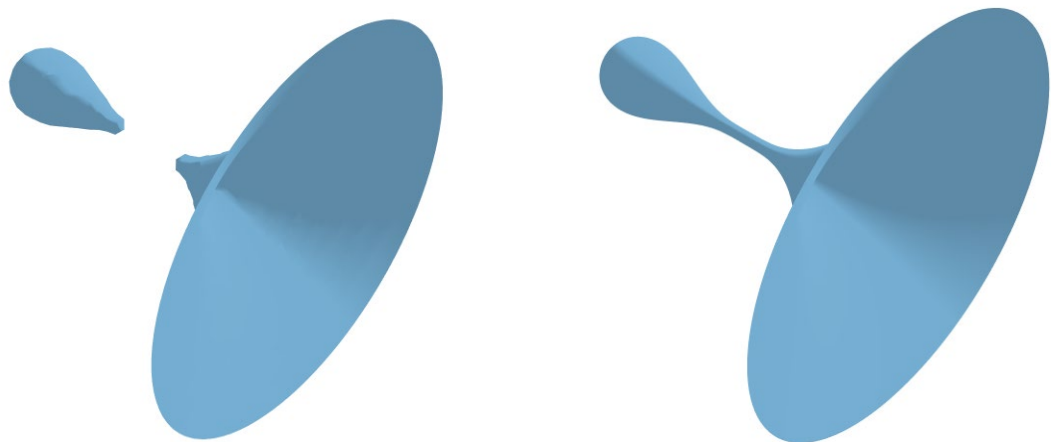
- Intel OneAPI CoE, the Intel Graphics and Visualization Institutes of XeLLENCE
- DOE Ab-initio Visualization for Innovative Science (AIVIS) grant 2428225
- U.S. Department of Energy (DOE) RAPIDS-2 SciDAC project under contract number DE-AC0500OR22725

- **Contact**

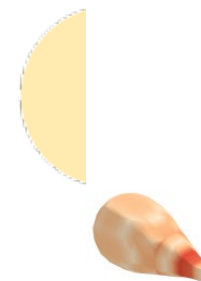
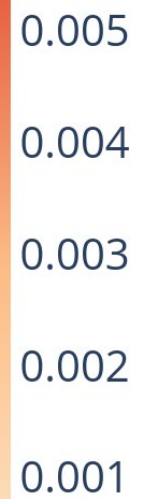
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- Email: [touermi@sci.Utah.edu](mailto:touermi@sci.Utah.edu)
- Preprint link: <https://arxiv.org/abs/2409.00043>



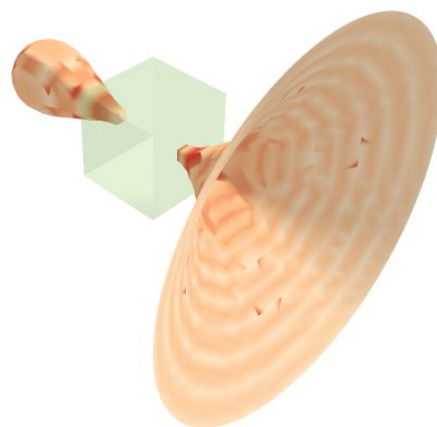
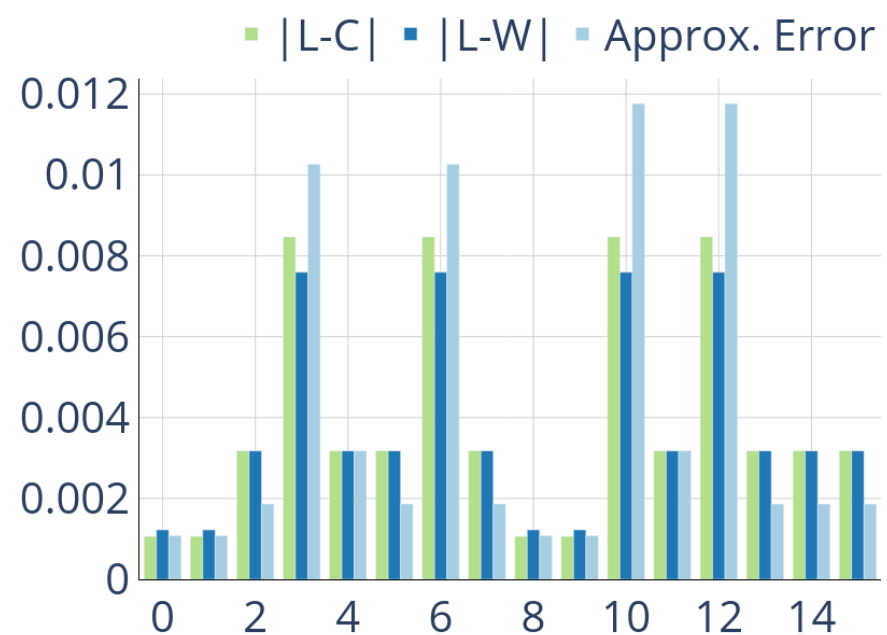
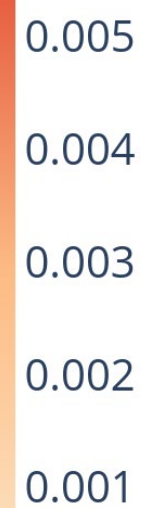




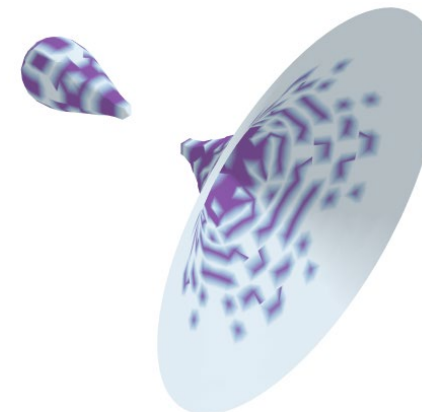
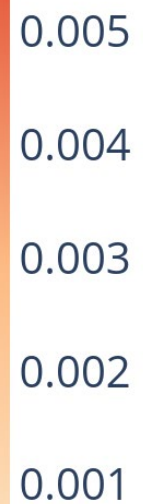
EC error



EC error



EC error



diff.

