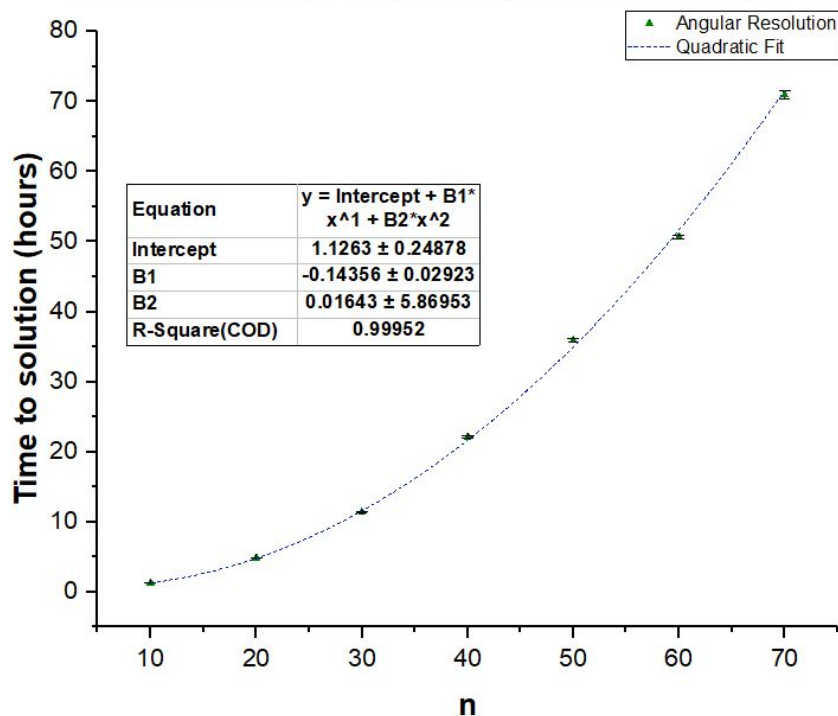# Week 11 Report Spring 2019
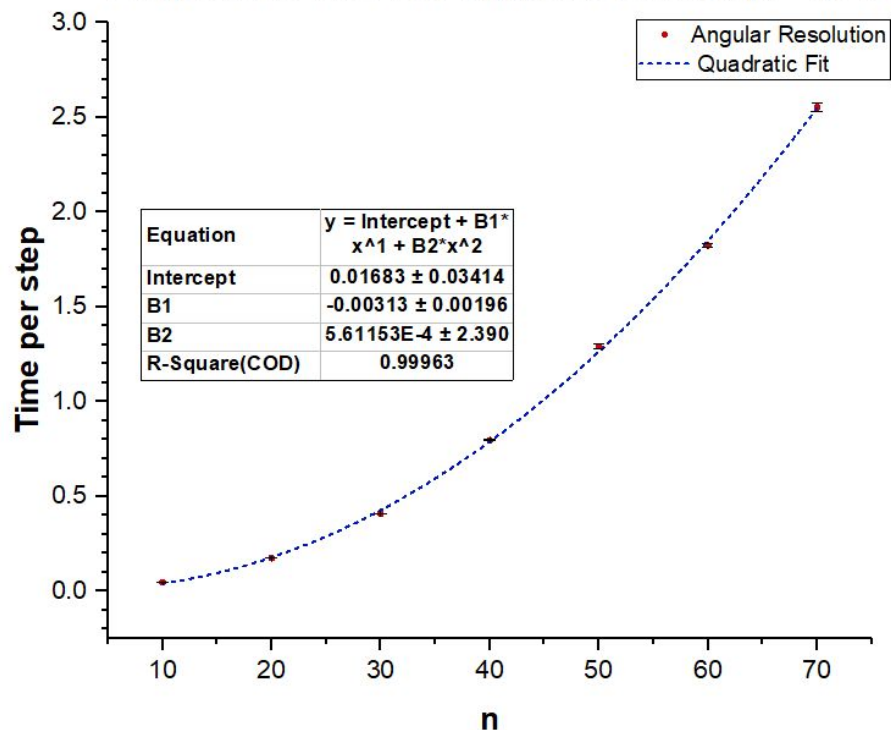
Sam Frederick

Quadratic Relation between Resolution and Computation Time

Time to Solution (t = 1 s) vs. Angular Resolution (n = π / dθ)
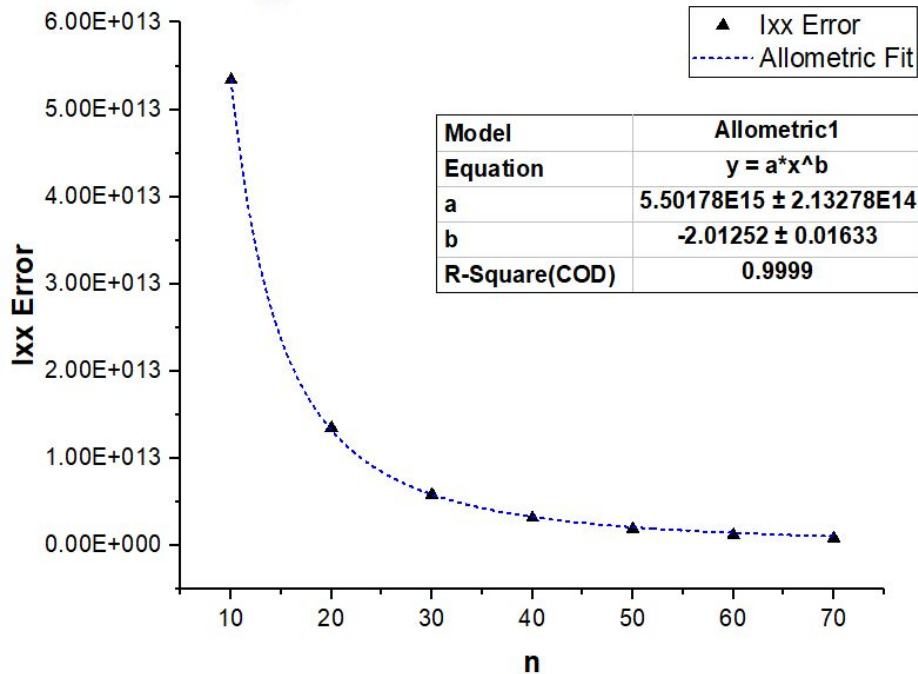
- Angular Resolution
- Quadratic Fit

Equation	y = Intercept + B1* x^1 + B2*x^2
Intercept	1.1263 ± 0.24878
B1	-0.14356 ± 0.02923
B2	0.01643 ± 5.86953
R-Square(COD)	0.99952

Time to solution (hours) vs. n

Computation Time vs. Angular Resolution (n = π / dθ)

- Angular Resolution
- Quadratic Fit

Equation	y = Intercept + B1* x^1 + B2*x^2
Intercept	0.01683 ± 0.03414
B1	-0.00313 ± 0.00196
B2	5.61153E-4 ± 2.390
R-Square(COD)	0.99963

Time per step vs. n

Izz / Ixx Error vs. Angular Resolution

Ixx Error vs. Angular Resolution (n = π / dθ)

▲ Ixx Error
--- Allometric Fit

Model	Allometric1
Equation	y = a*x^b
a	5.50178E15 ± 2.13278E14
b	-2.01252 ± 0.01633
R-Square(COD)	0.9999

Izz Error vs. Angular Resolution (n = π / dθ)

▼ Izz Error
--- Allometric Fit

Model	Allometric1
Equation	y = a*x^b
a	6.5877E15 ± 2.22038E1
b	-1.99833 ± 0.01419
R-Square(COD)	0.99992
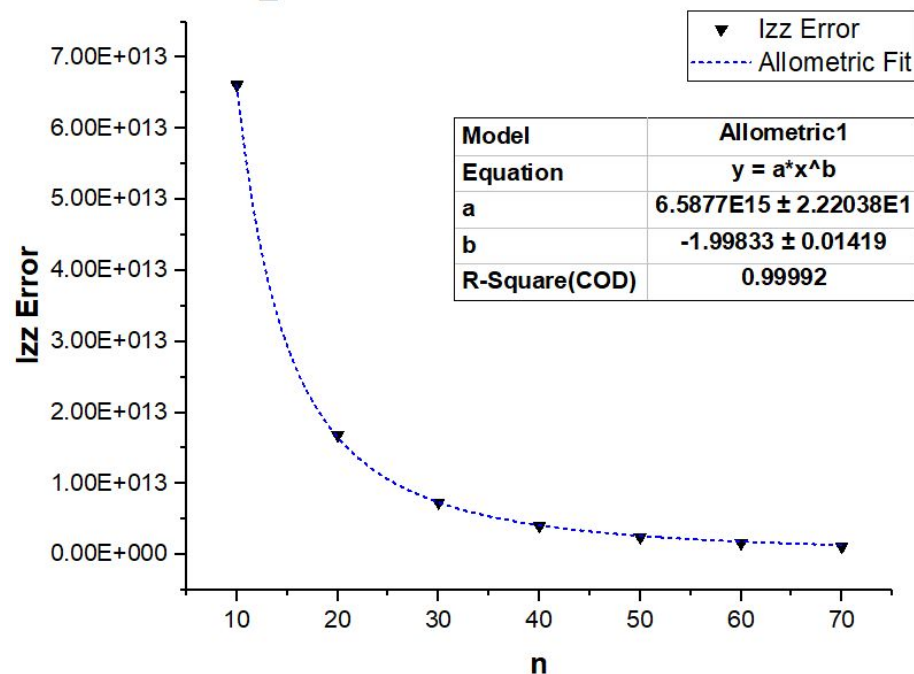
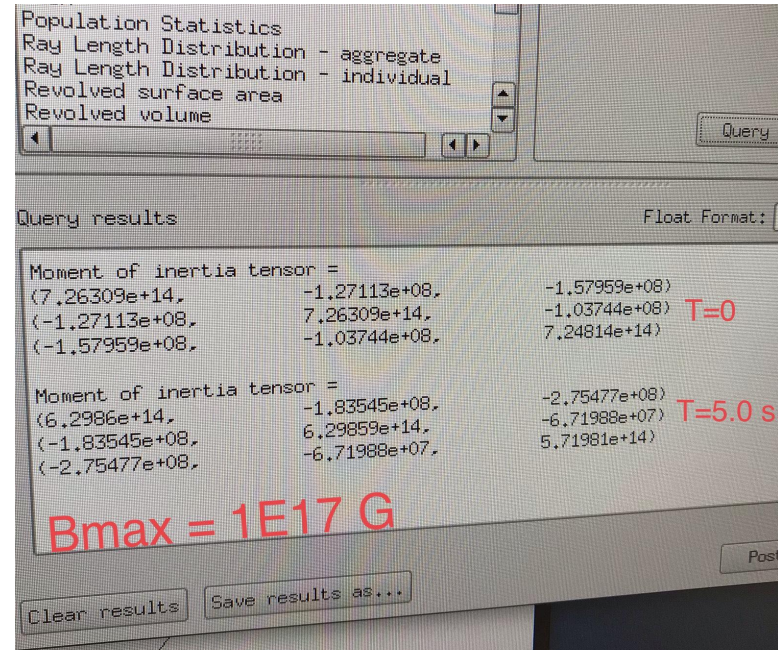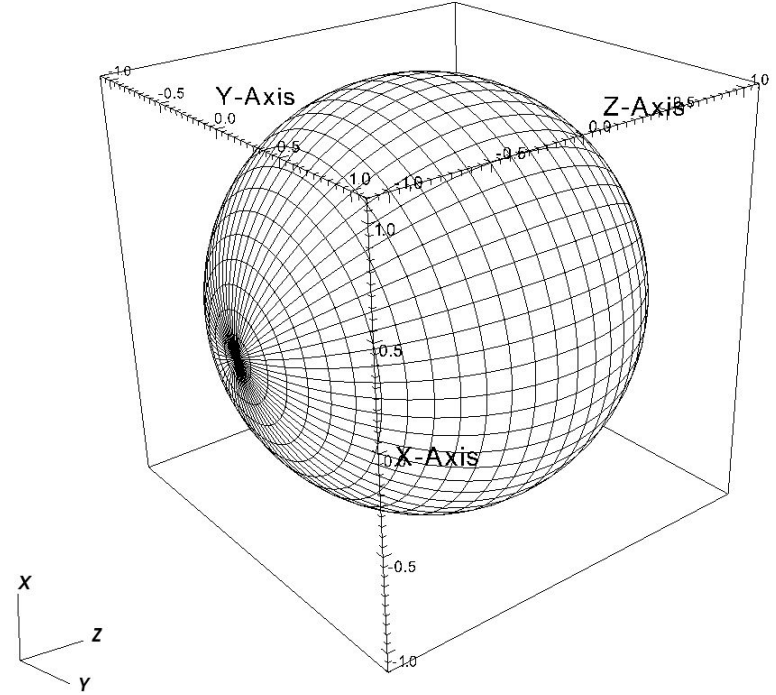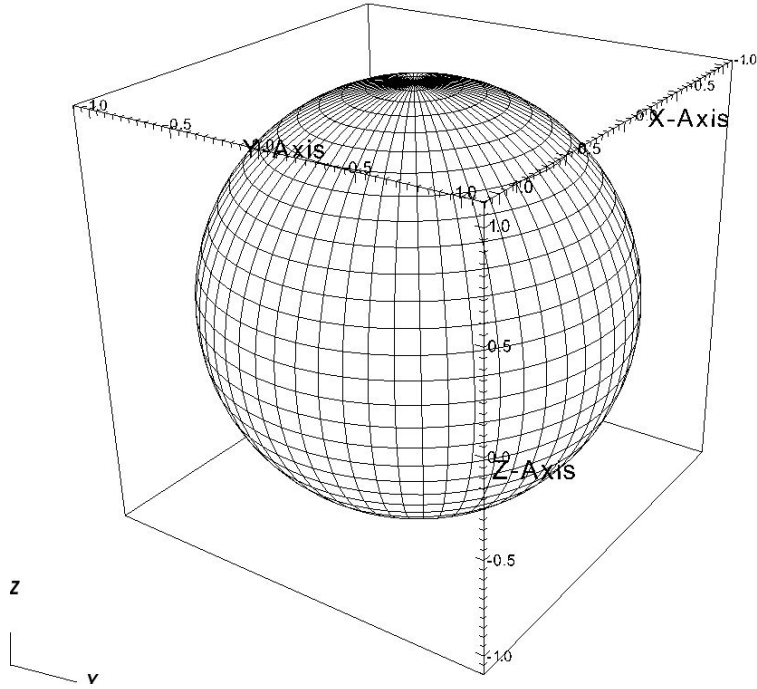# VisIt Queries
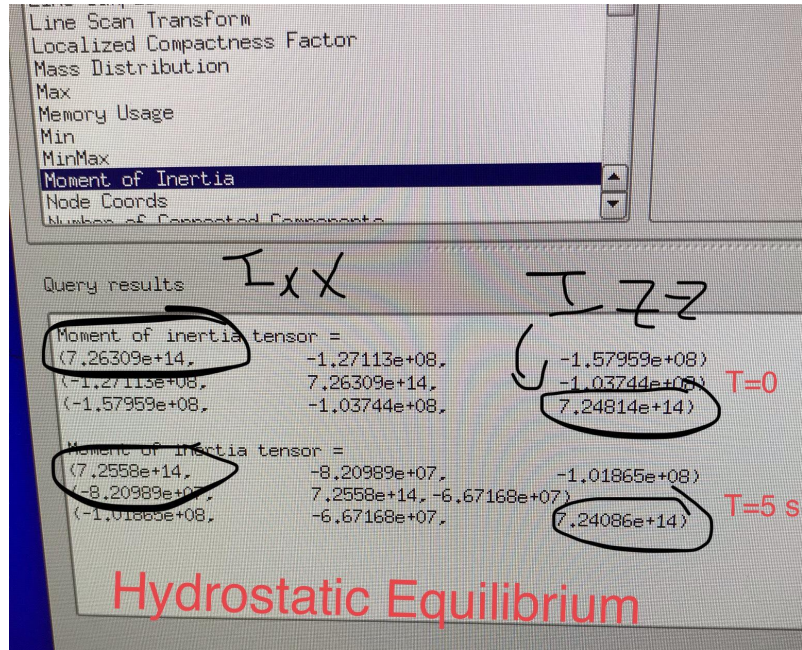
ΔIxx = 0.00729E14   ΔIzz = 0.00728E14

Grid Mesh Explains Difference Between Izz & Ixx

Idea

- Volume error is due to difference between outermost grid cells and sphere.
- With sufficiently radial high resolution, the "missing" component for outermost grid cells is small relative to volume of grid cell.
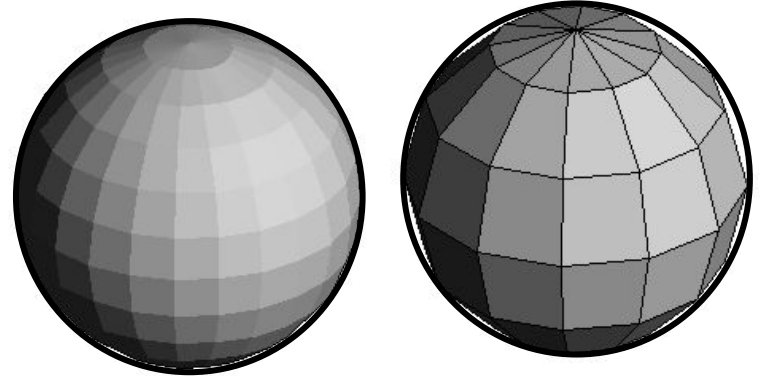- Could "add back in" missing component (effectively increase dV of outer cells slightly).

Image credit: Washington University