

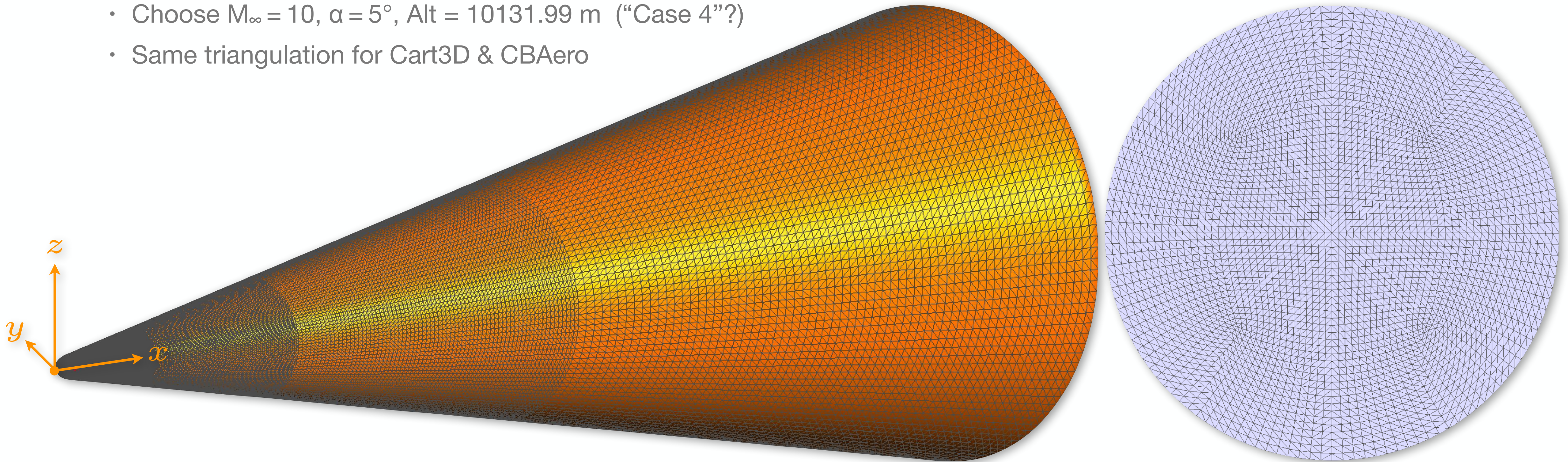
Back to Stream Geometry

• \

CBAero Anchoring: STREAM geometry

Use Cart3D inviscid solutions to anchor CBAero database

- “Anchoring” matches the CBAero solution to the Cart3D inviscid simulation and drives the CBAero B-L & aerothermal analysis using this as “edge” conditions
- Use DoE STREAM geometry, 10° cone-angle, $r_{\text{nose}} = 0.01L$, $L = 1\text{m}$,
- Initial analysis using perfect gas for Cart3D, but can use Equilib as well
- ESP geometry with 86k triangles & good curvature alignment
- Choose $M_\infty = 10$, $\alpha = 5^\circ$, Alt = 10131.99 m (“Case 4”?)
- Same triangulation for Cart3D & CBAero



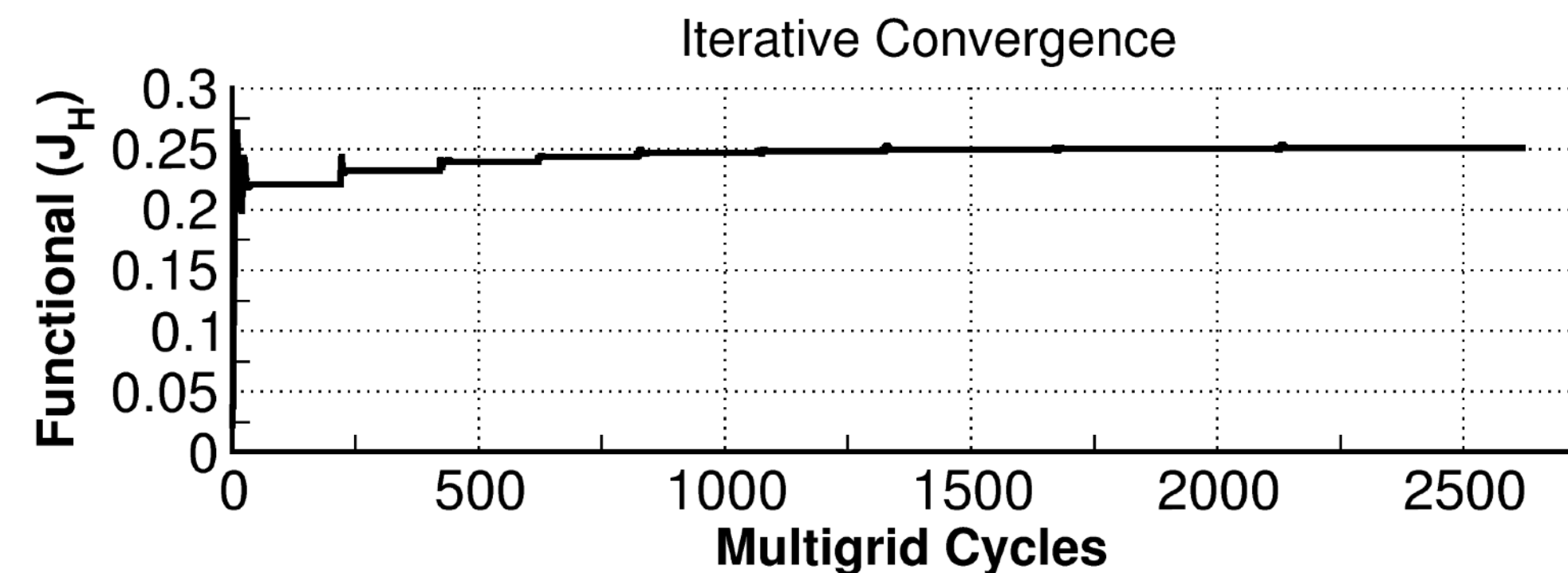
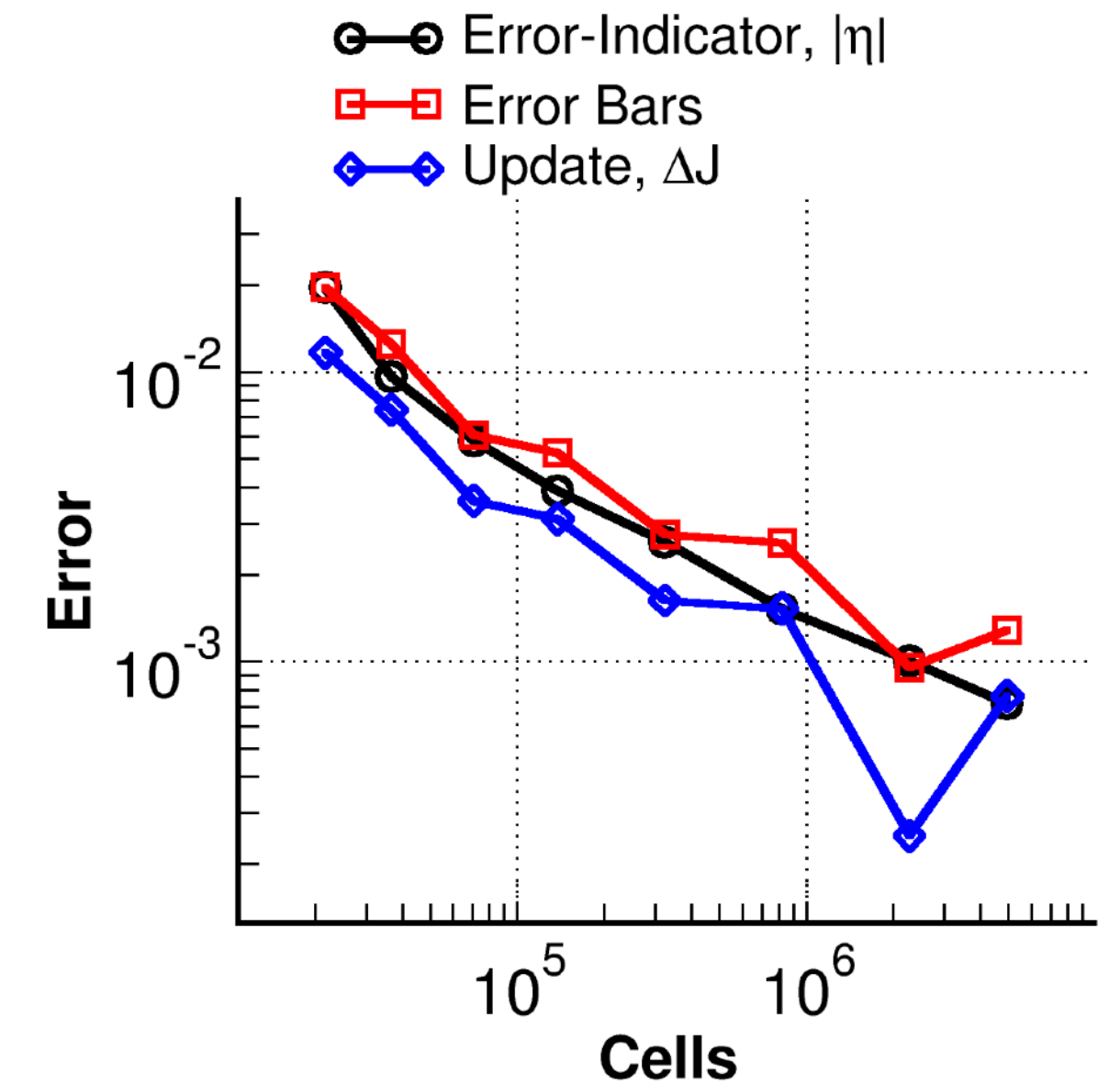
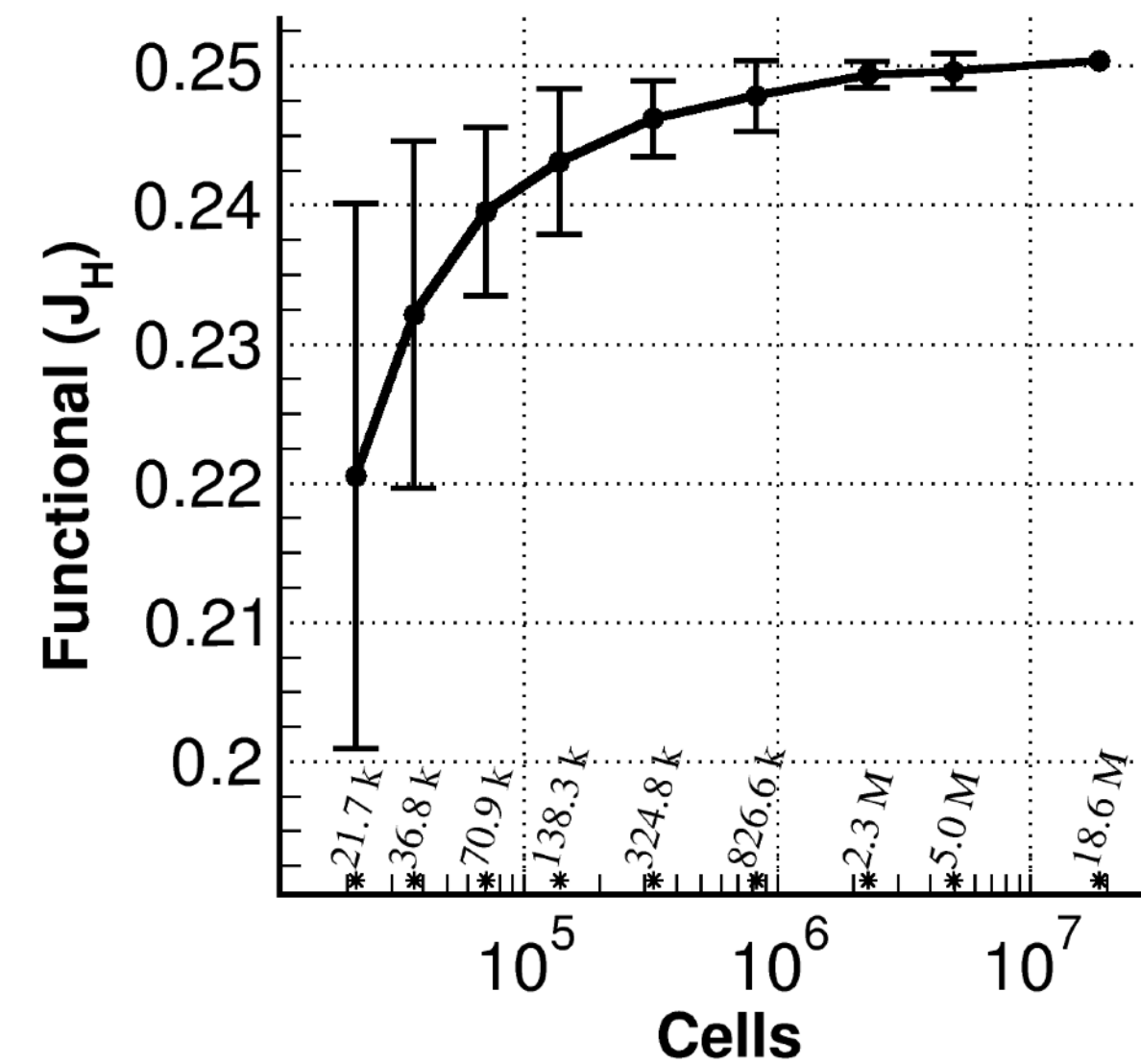
Aft face has separate component ID

CBAero Anchoring: STREAM geometry

Use Cart3D inviscid solutions to anchor CBAero database

- Used Cart3D w/ output based refinement
- Textbook mesh convergence behavior
- Adaptation: $\mathcal{J} = \sum_{j=A,N,y} C_{j,\text{Body}} + 0.1 C_{A,\text{Base}}$

Tue Apr 20 14:20:28 2021

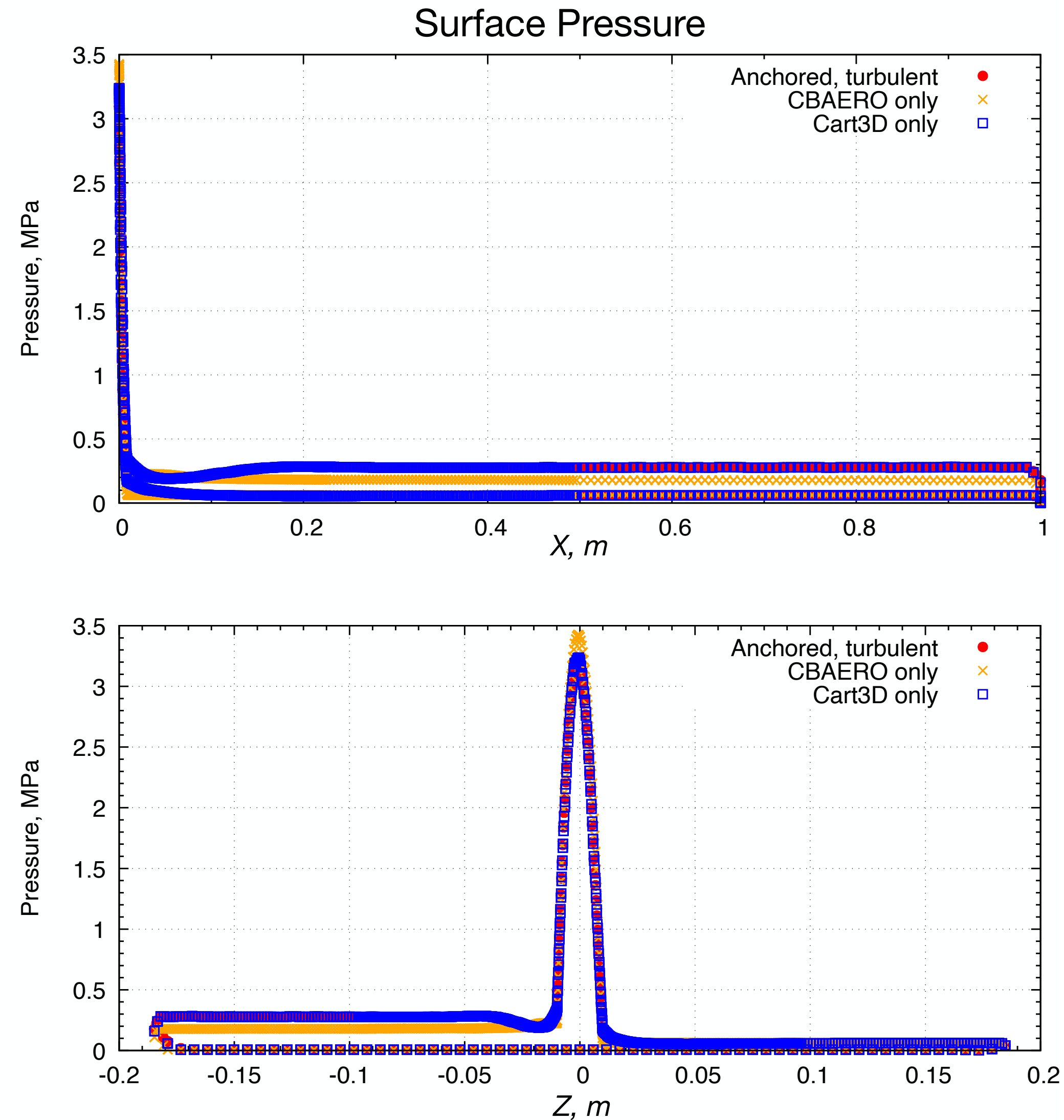


maxRef = 14

/nobackup/maftosmi/cases/doe_stream/doe_stream/m10a05

CBAero Anchoring: STREAM geometry

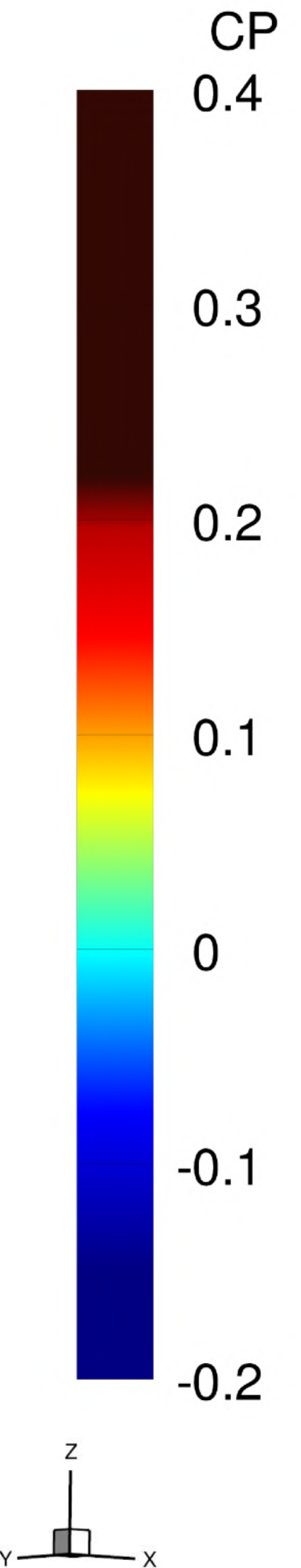
$M_\infty = 10$, $\alpha = 5^\circ$, Alt = 10131.99 m



Anchored
Cart3D + CBAero

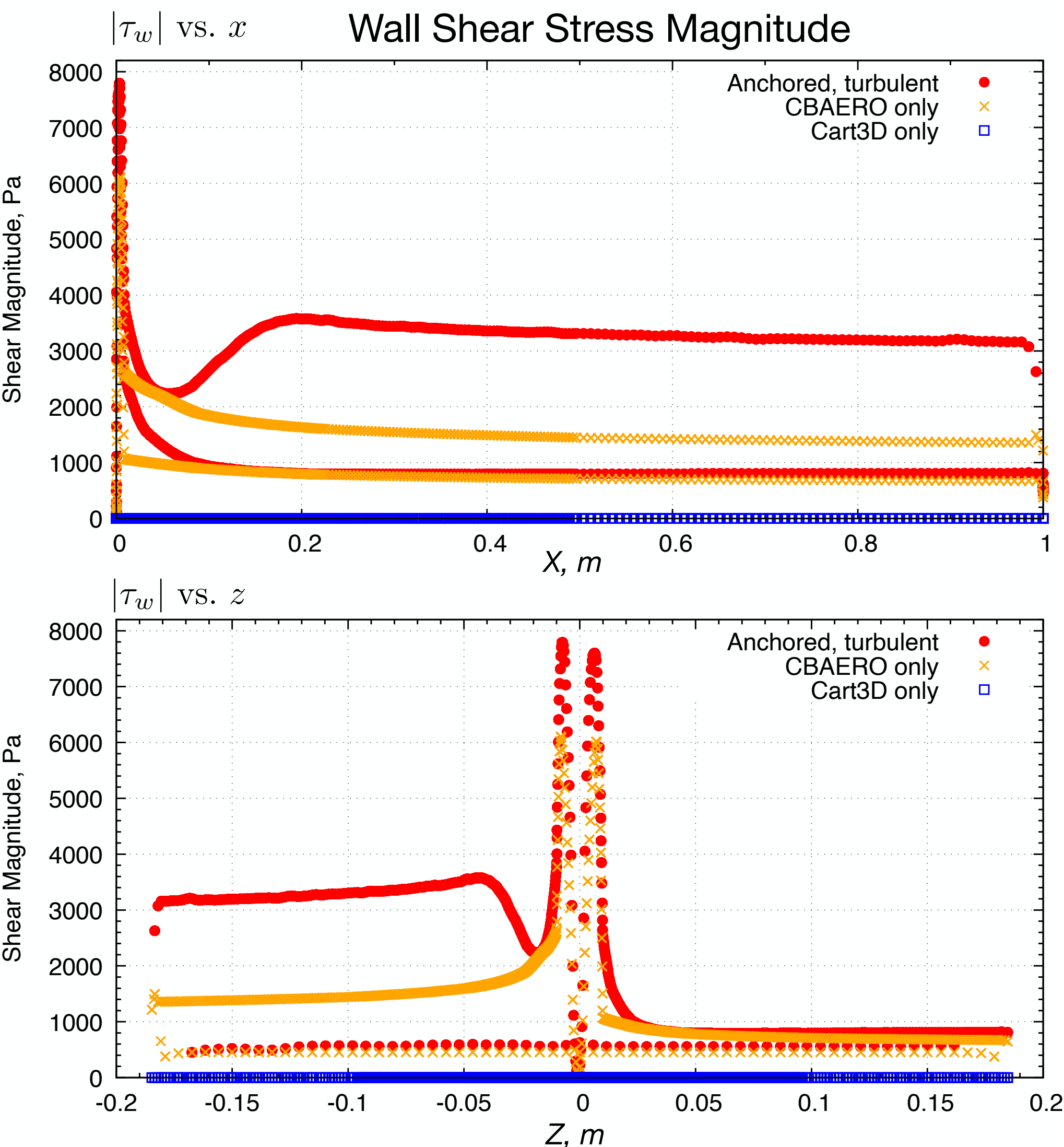
Cart3D

CBAero

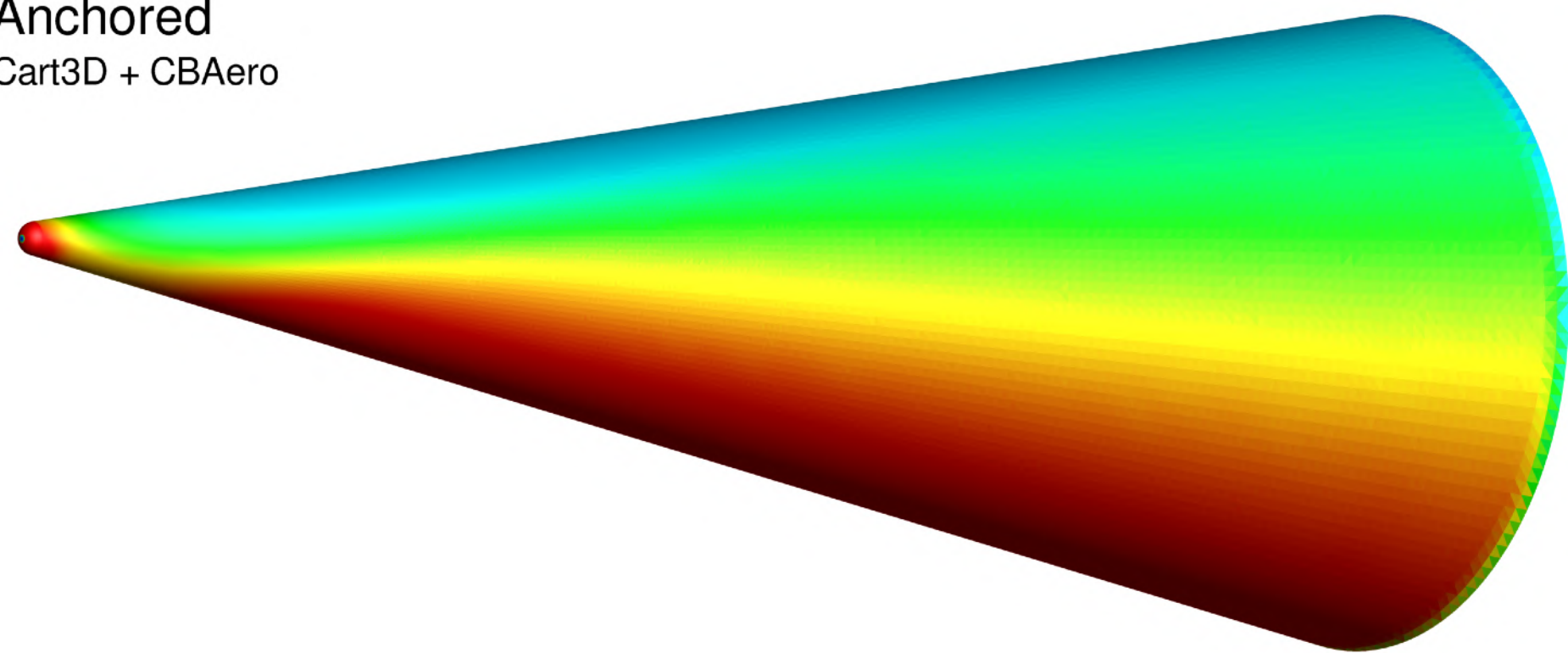


CBAero Anchoring: STREAM geometry

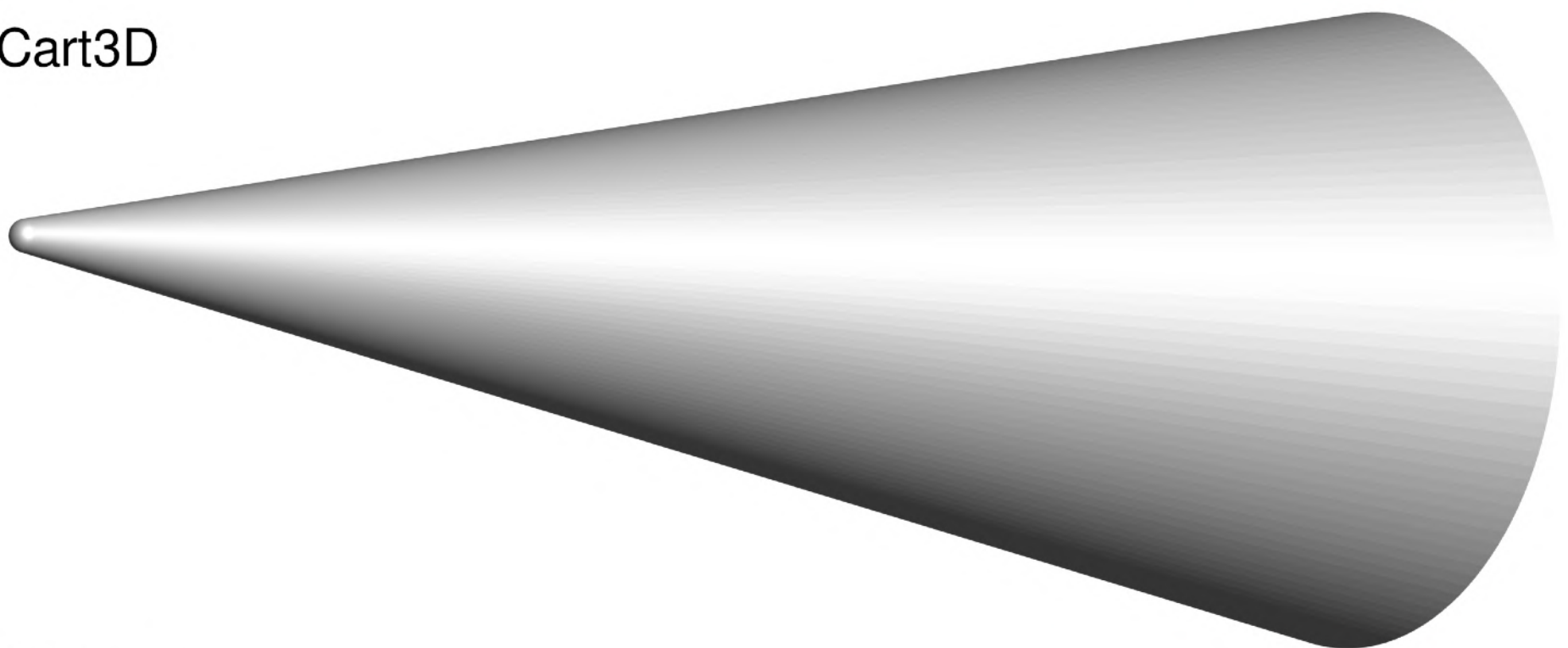
$M_\infty = 10, \alpha = 5^\circ, \text{Alt} = 10131.99 \text{ m}$



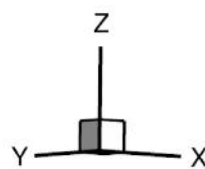
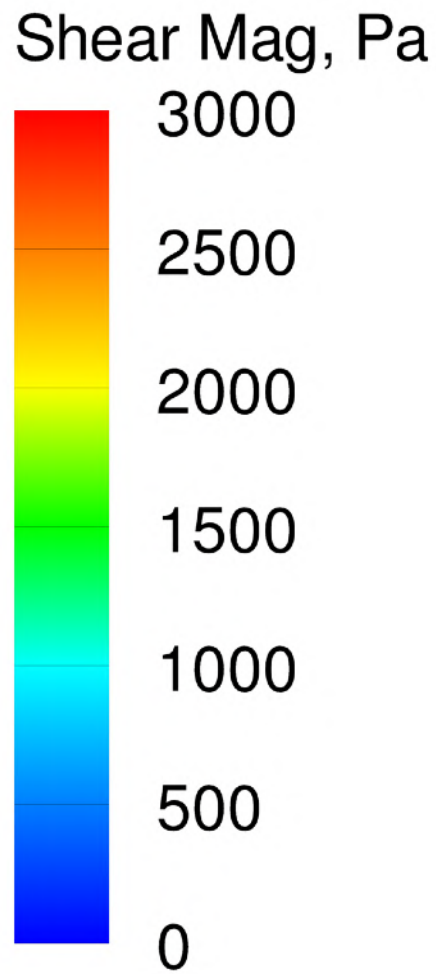
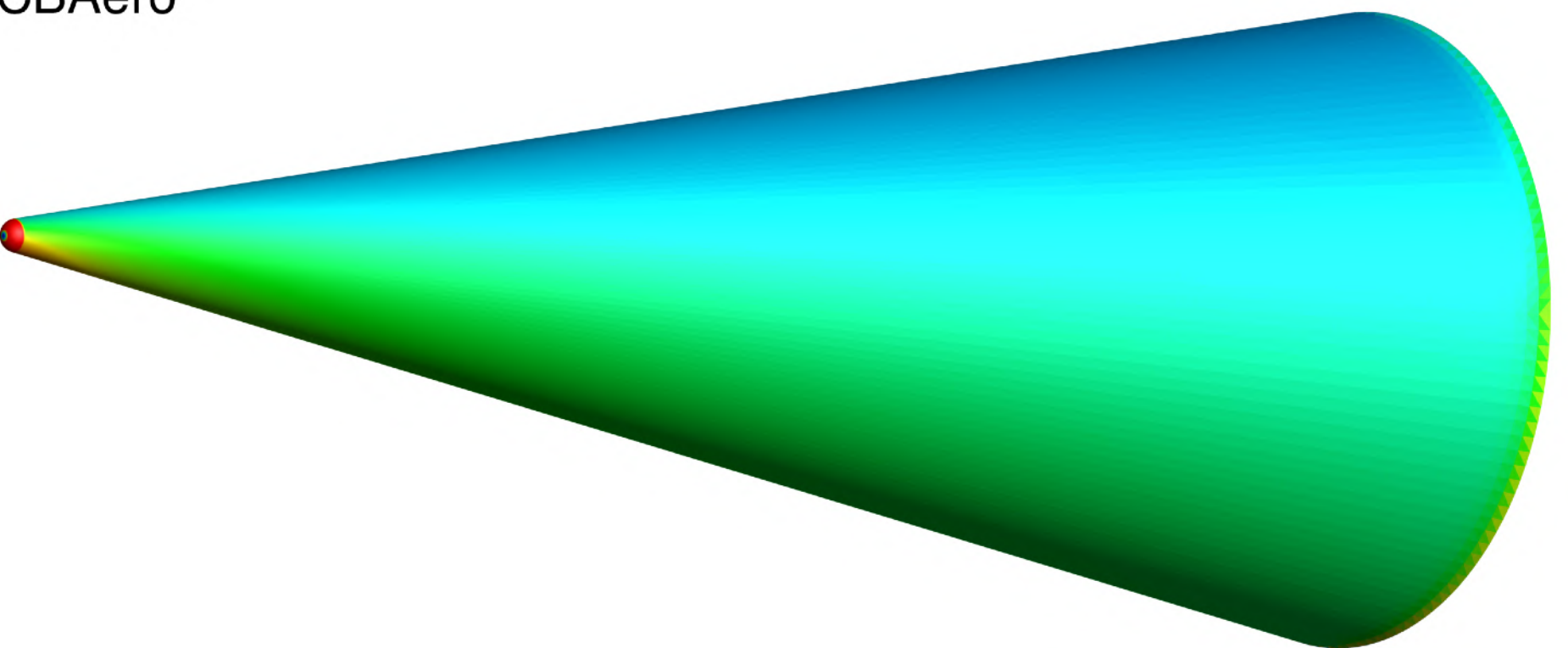
Anchored
Cart3D + CBAero



Cart3D

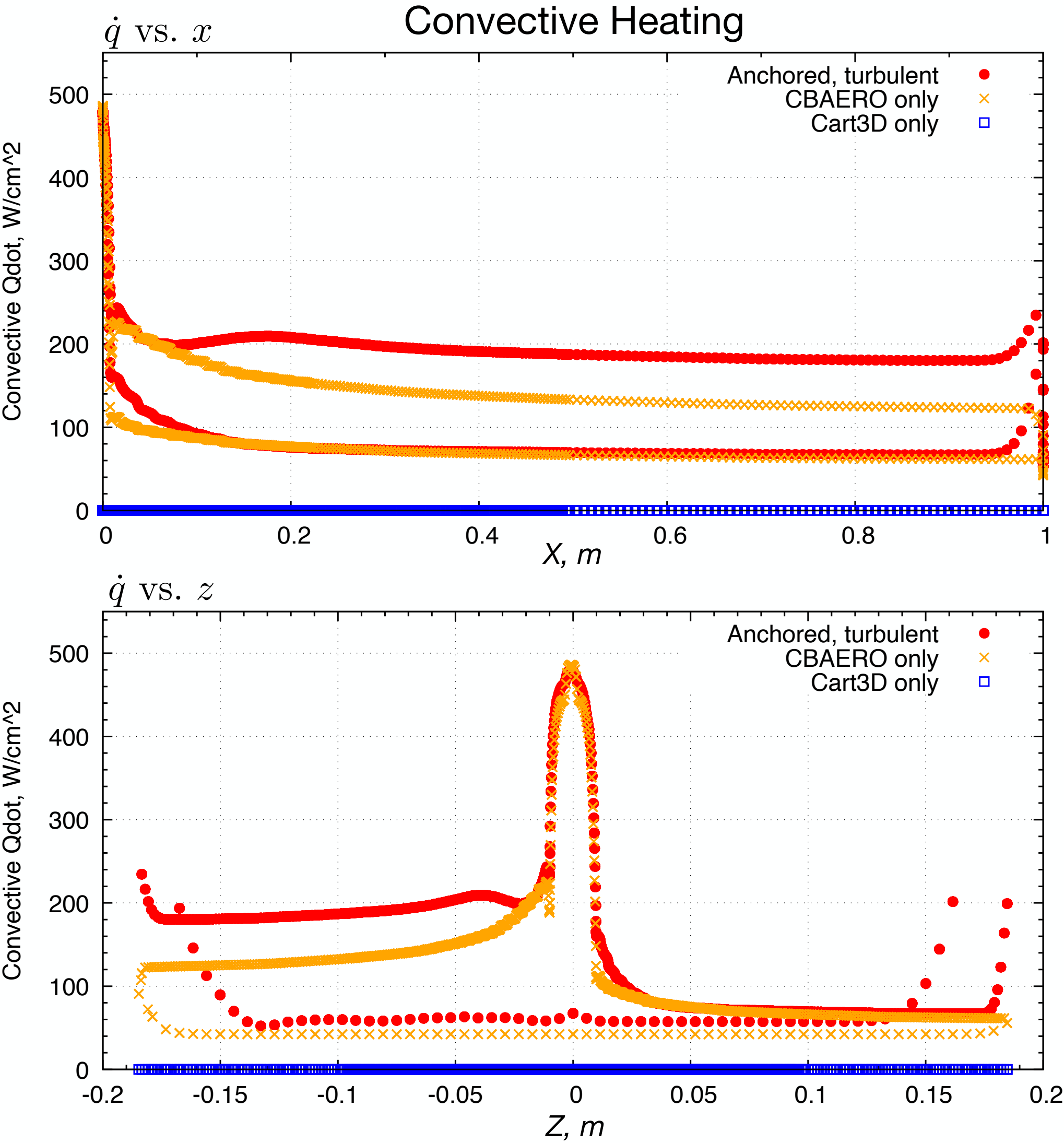


CBAero



CBAero Anchoring: STREAM geometry

$M_\infty = 10, \alpha = 5^\circ, \text{Alt} = 10131.99 \text{ m}$



Anchored
Cart3D + CBAero

Cart3D

CBAero

is this
correct?

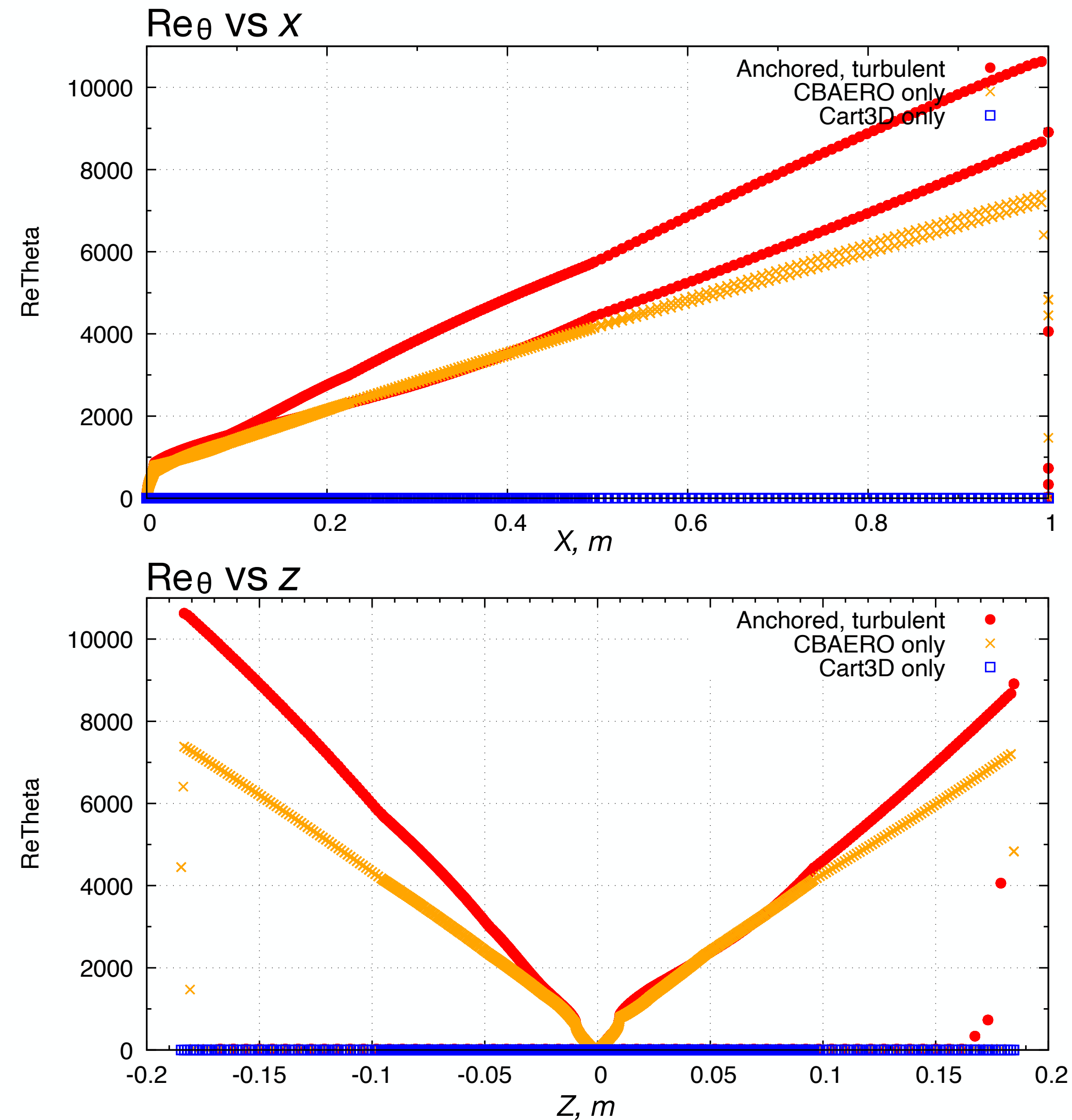
Qdot, Watts/cm^2

200
175
150
125
100
75
50
25
0

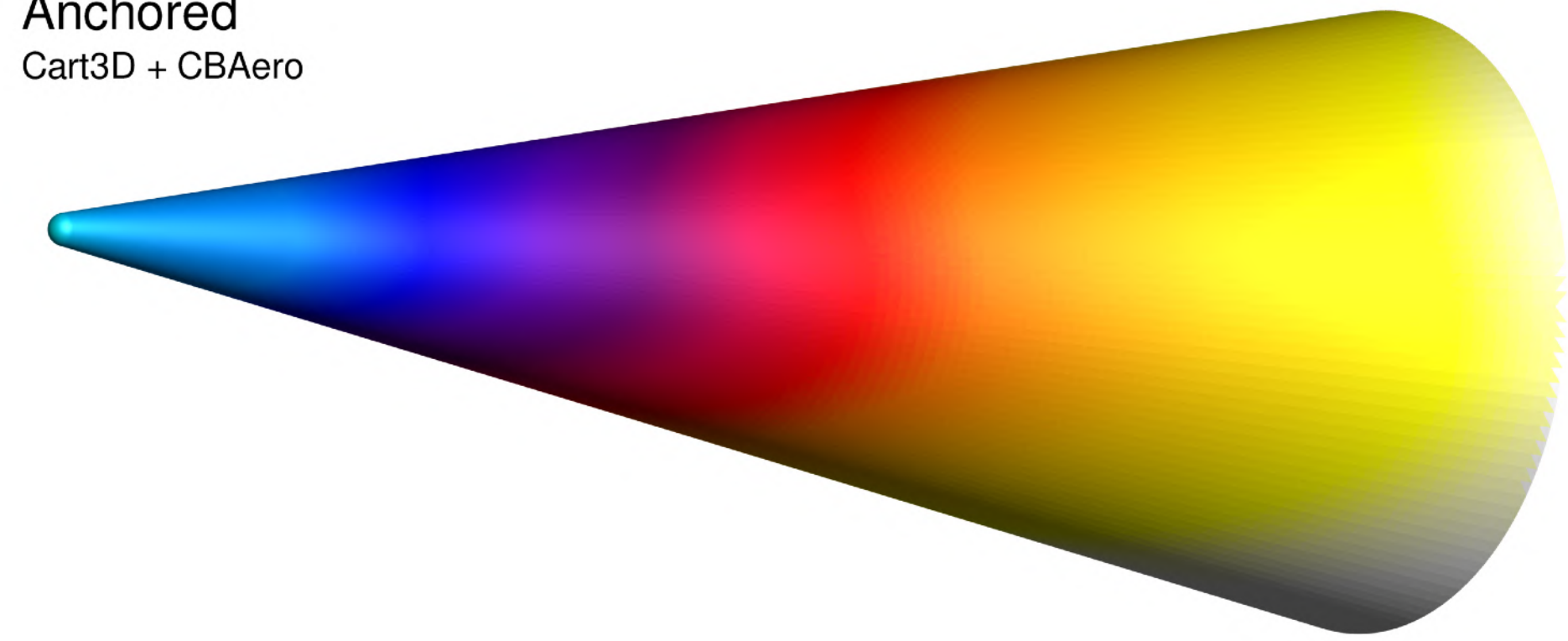
is this
correct?

CBAero Anchoring: STREAM geometry

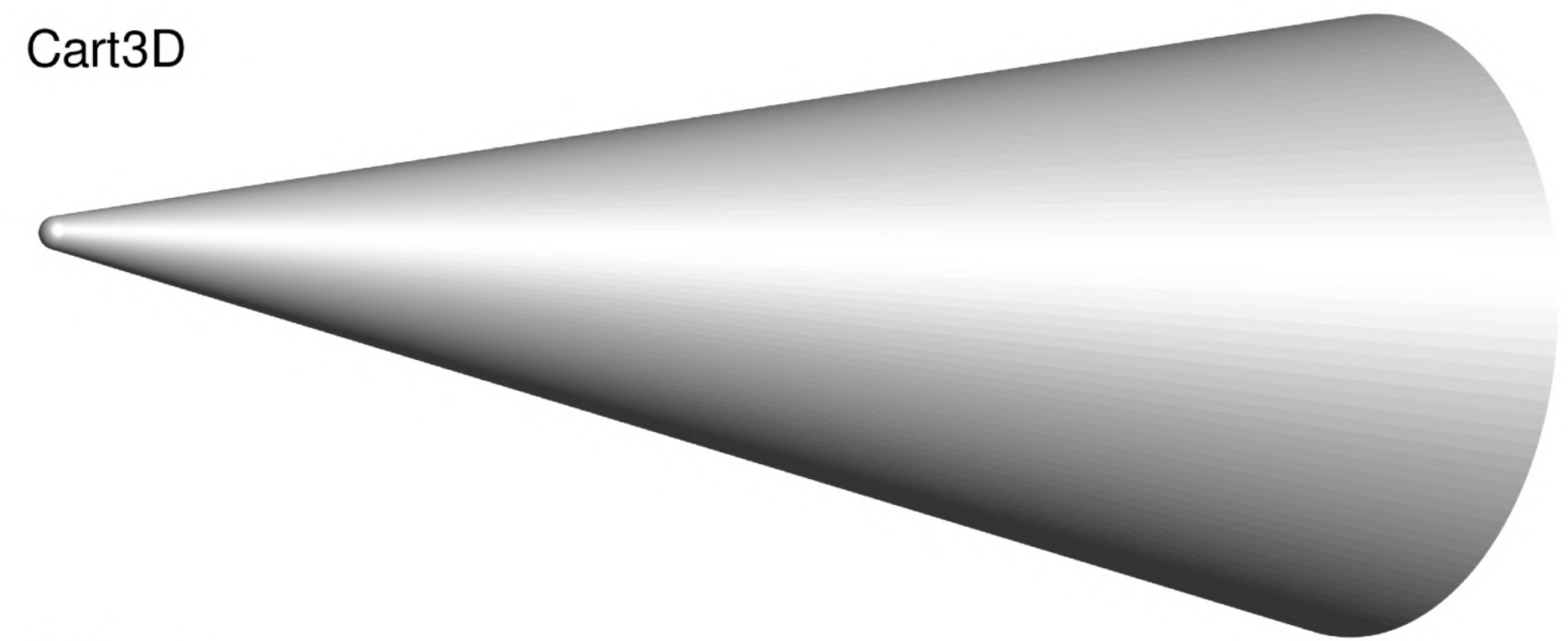
$M_\infty = 10$, $\alpha = 5^\circ$, Alt = 10131.99 m



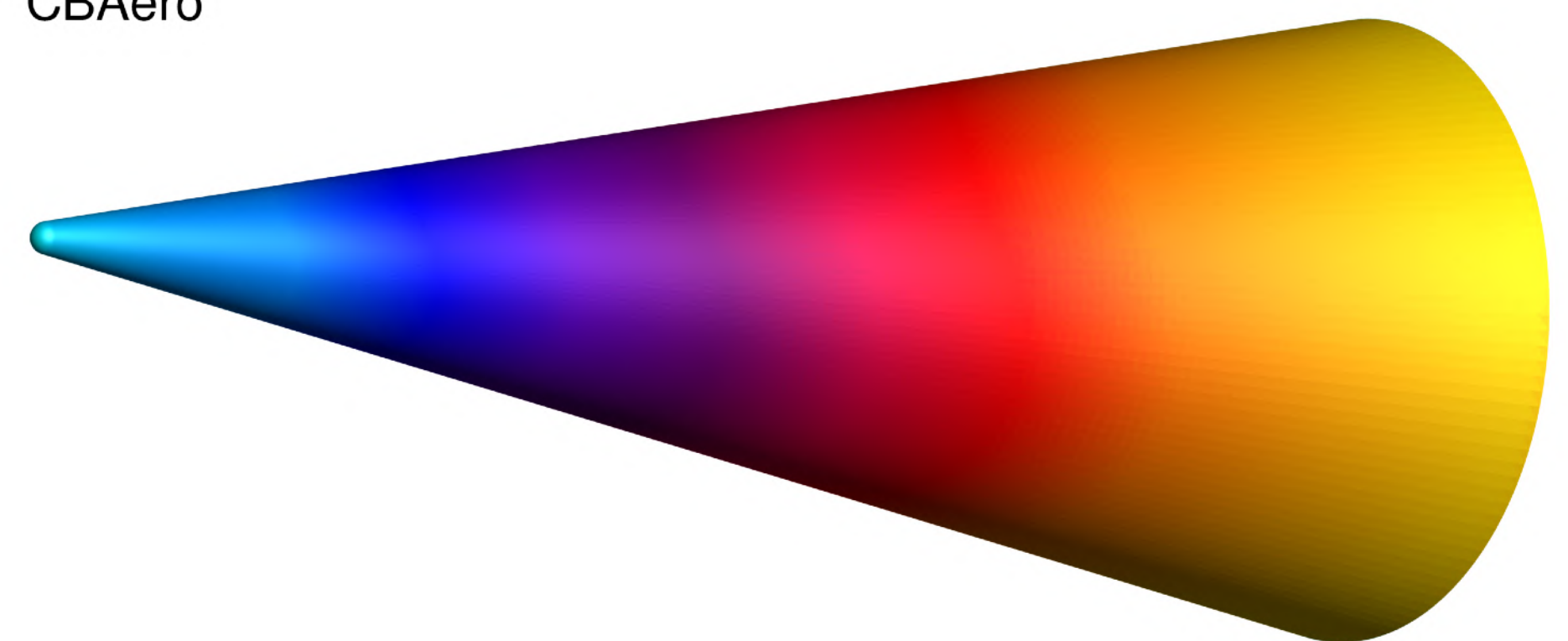
Anchored
Cart3D + CBAero



Cart3D



CBAero



Re-Theta

