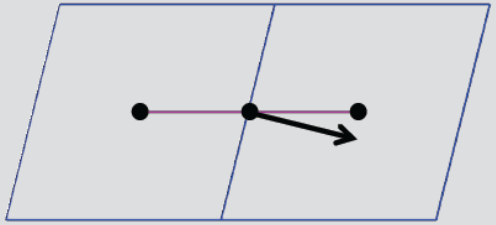
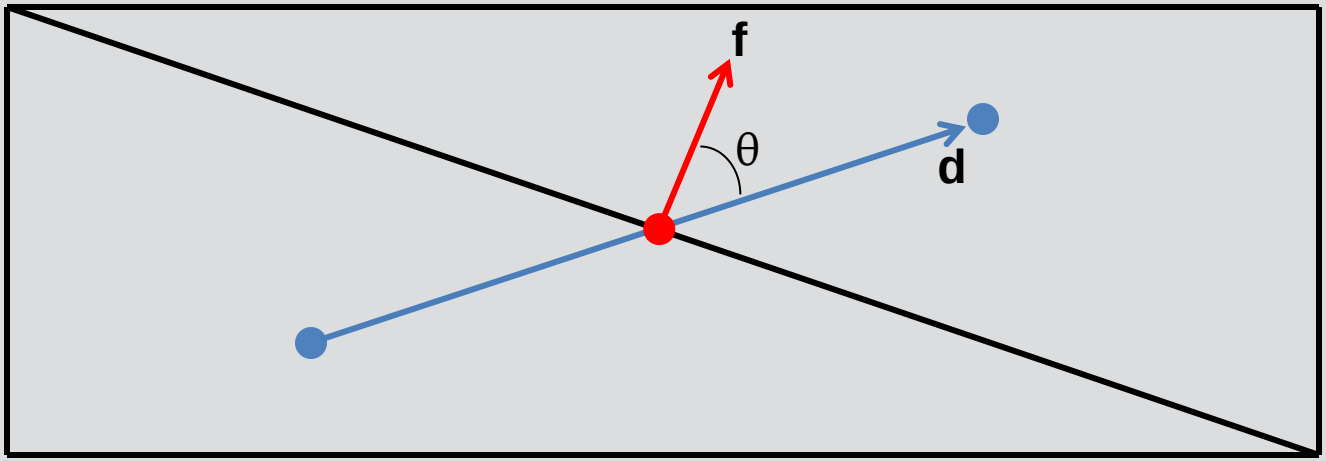
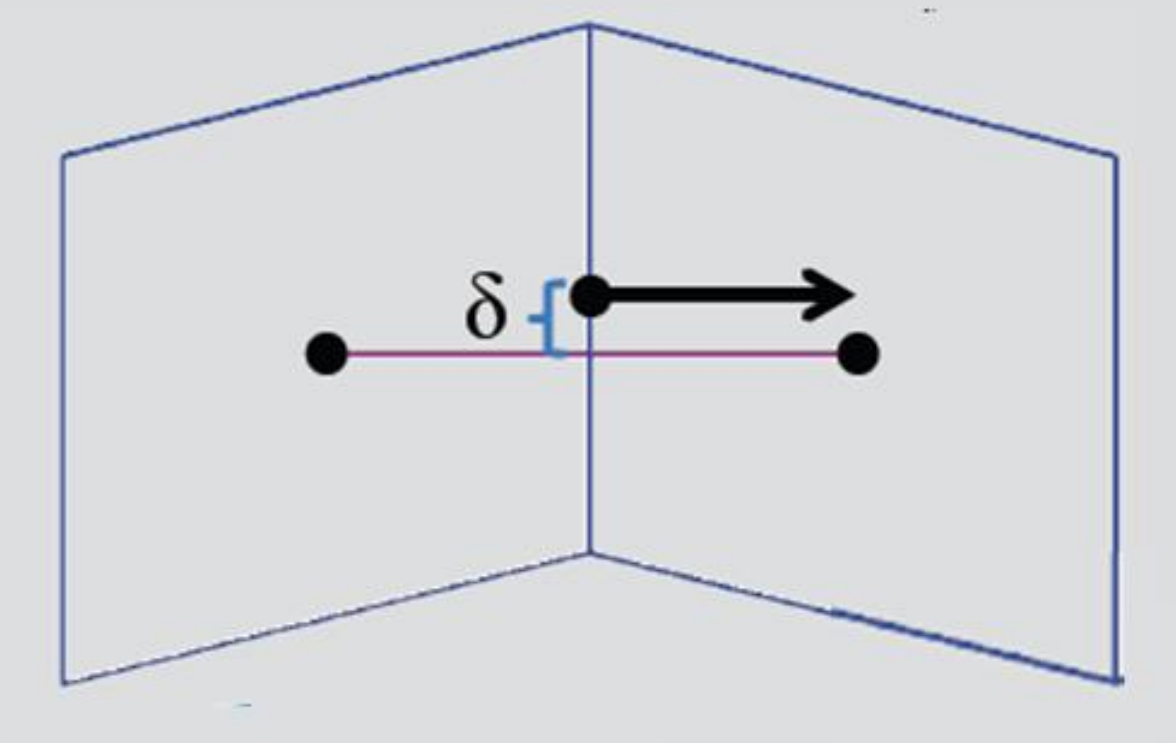
Reliable CFD Meshing



Orthogonality

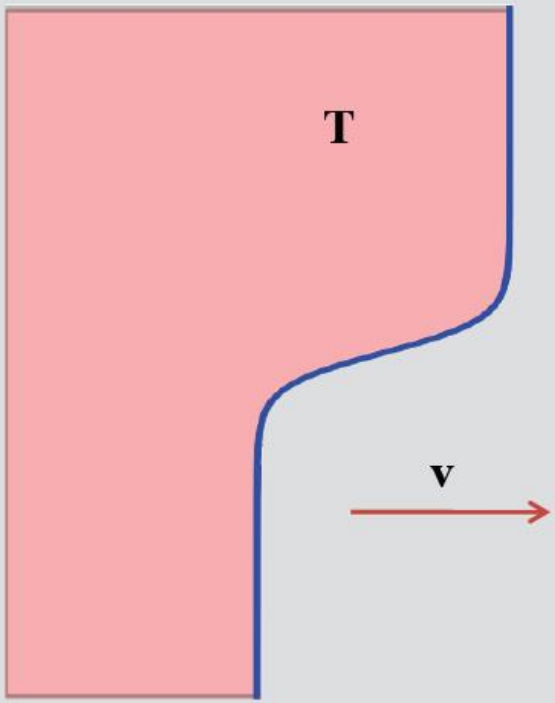


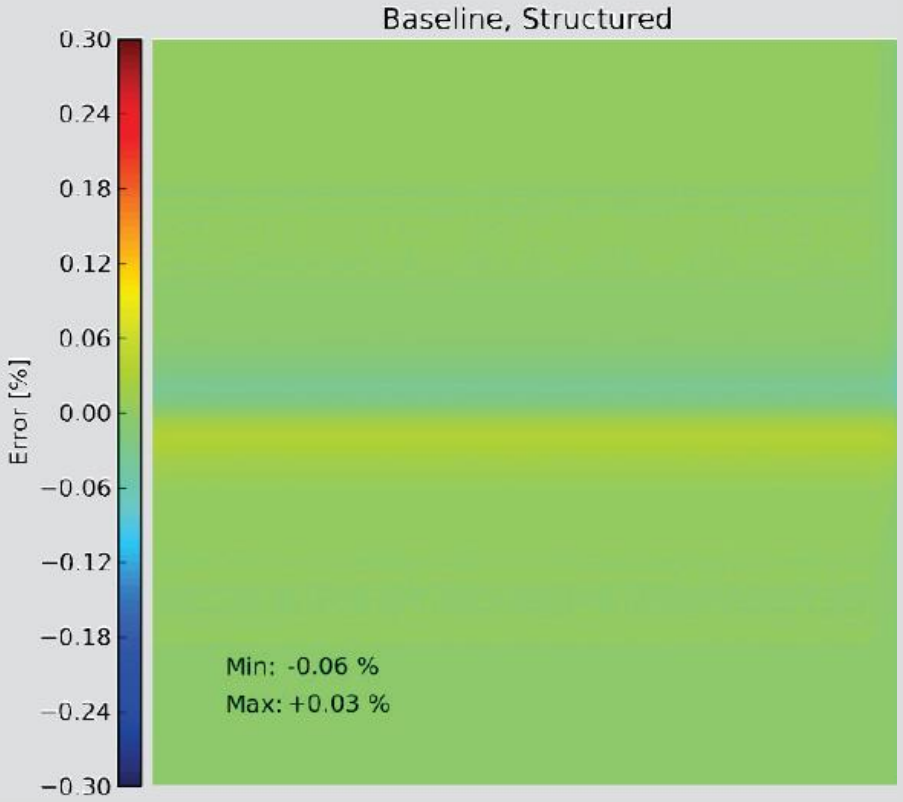
Skewness



Numerical effects

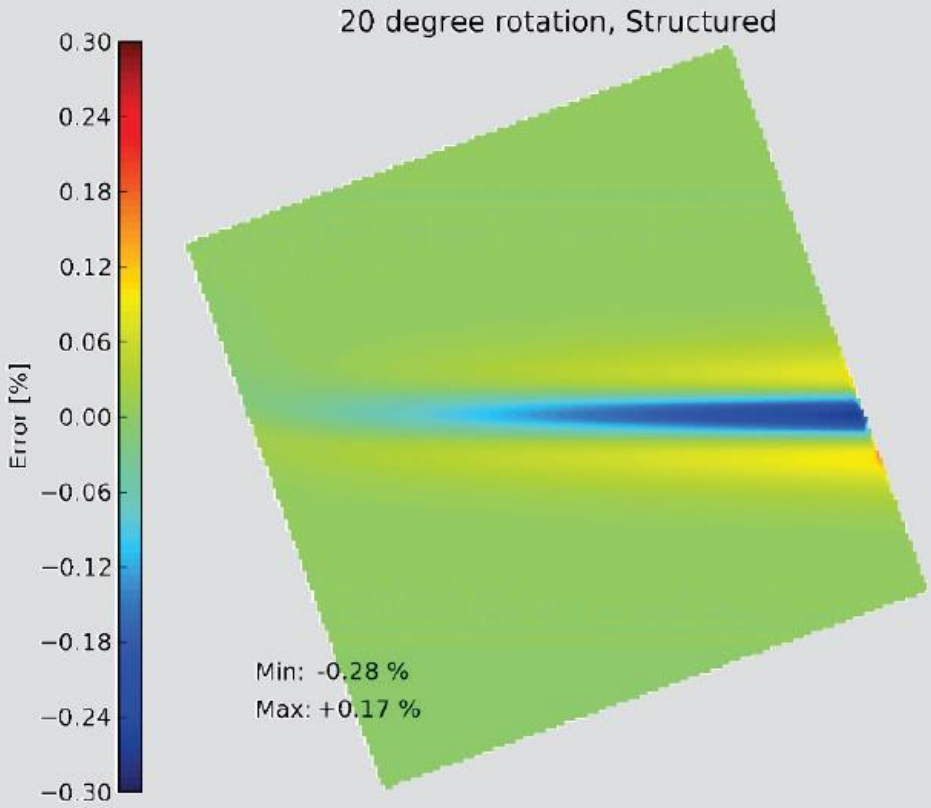
- Baseline
  - Advection-only test case

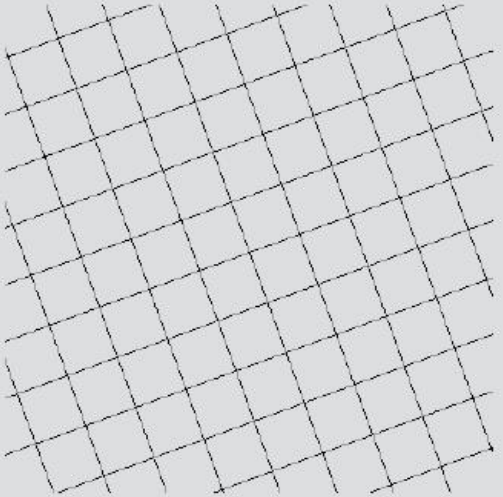


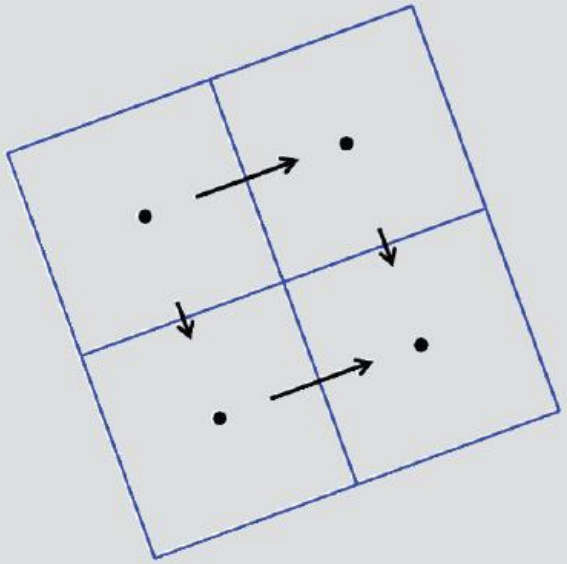


Numerical effects

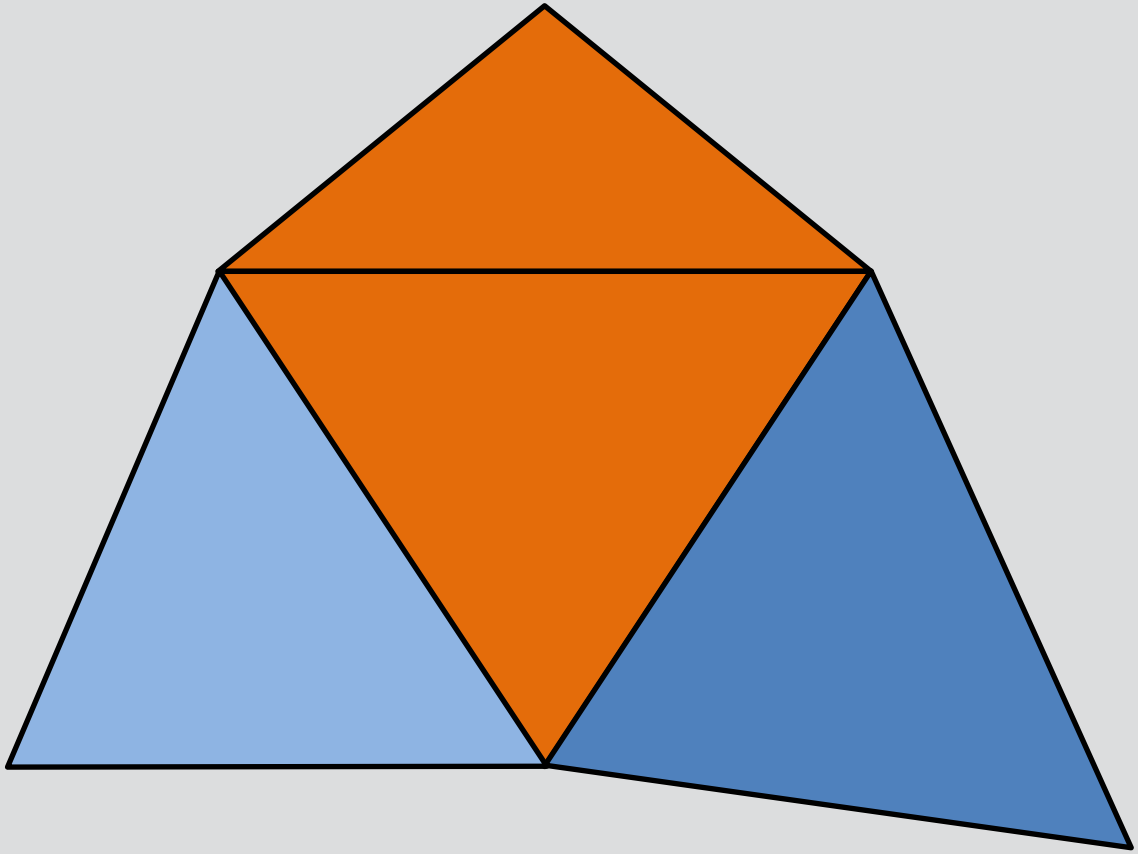
- Numerical mixing



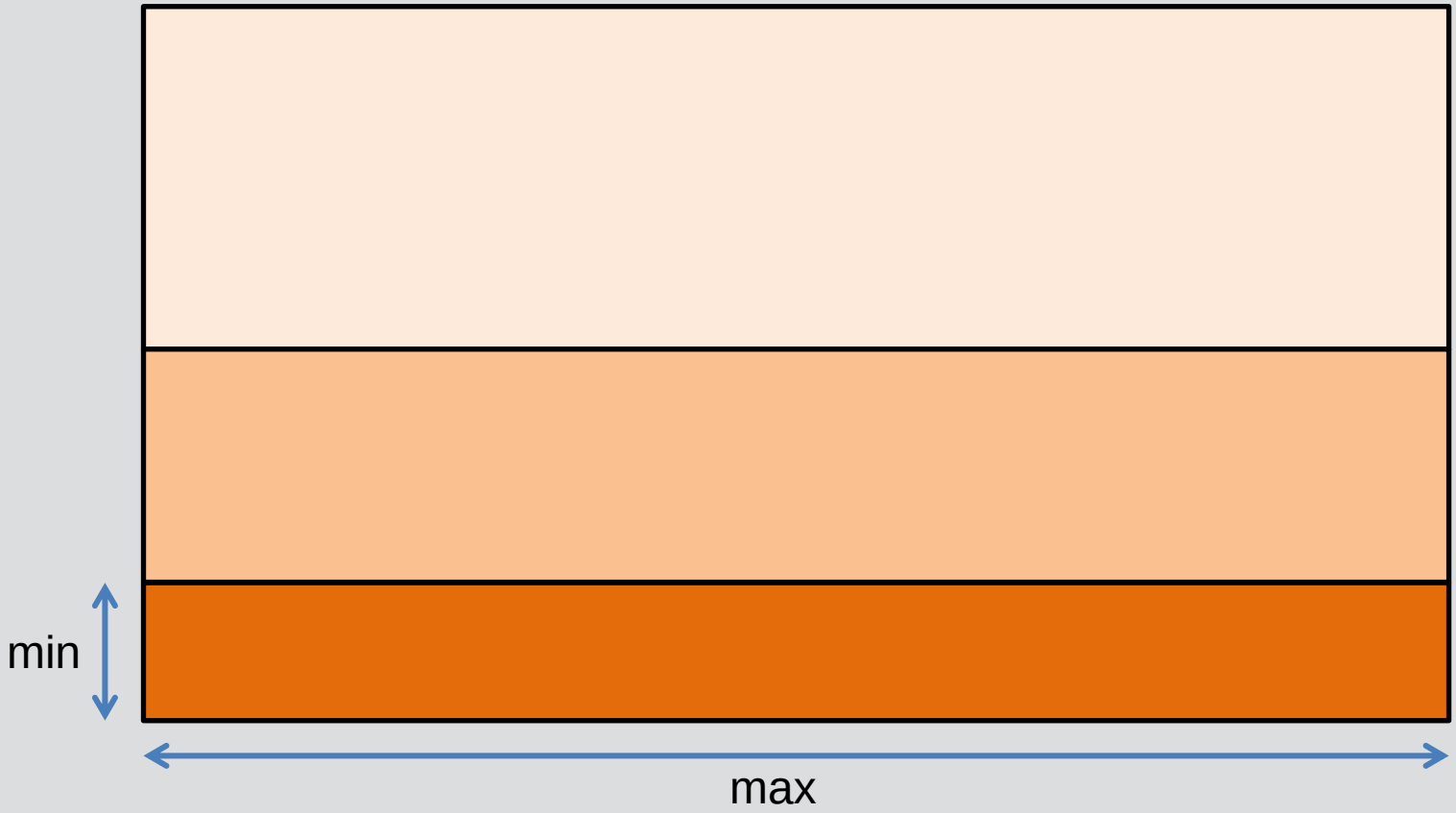




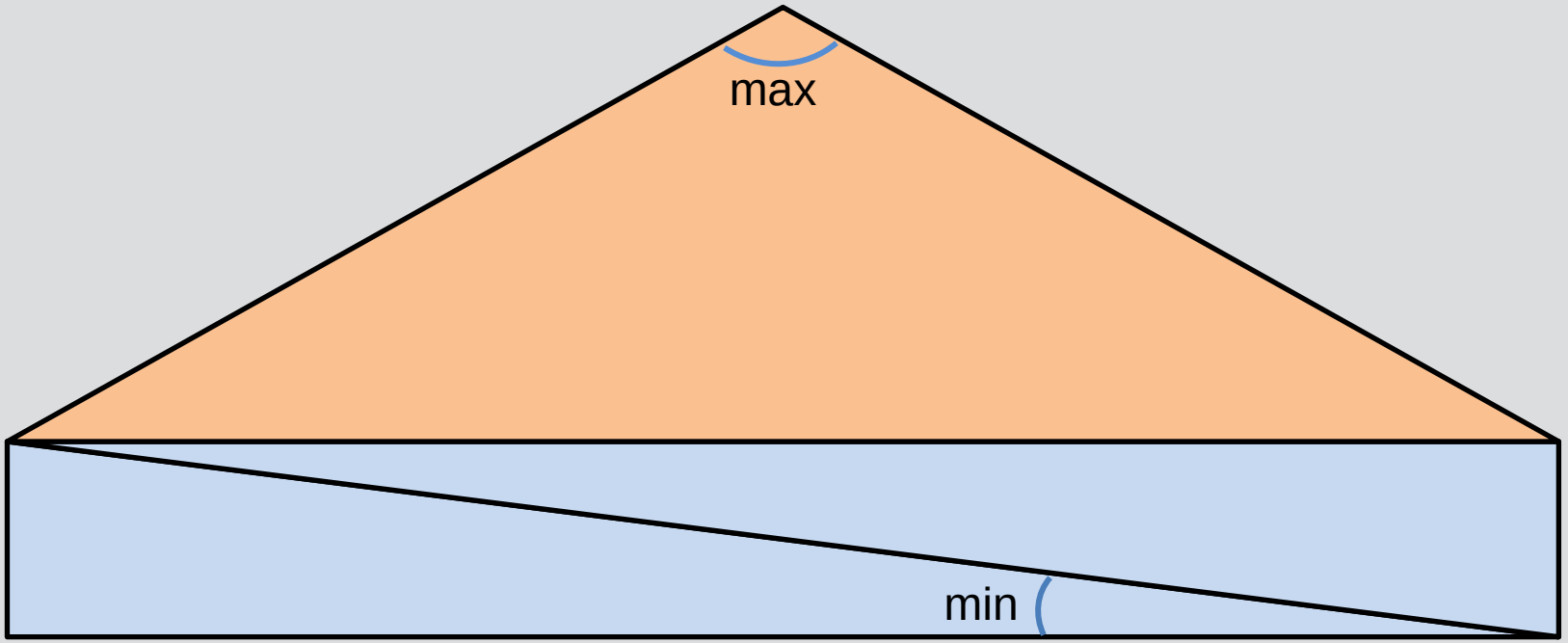
Area/Volume Ratio



Aspect Ratio

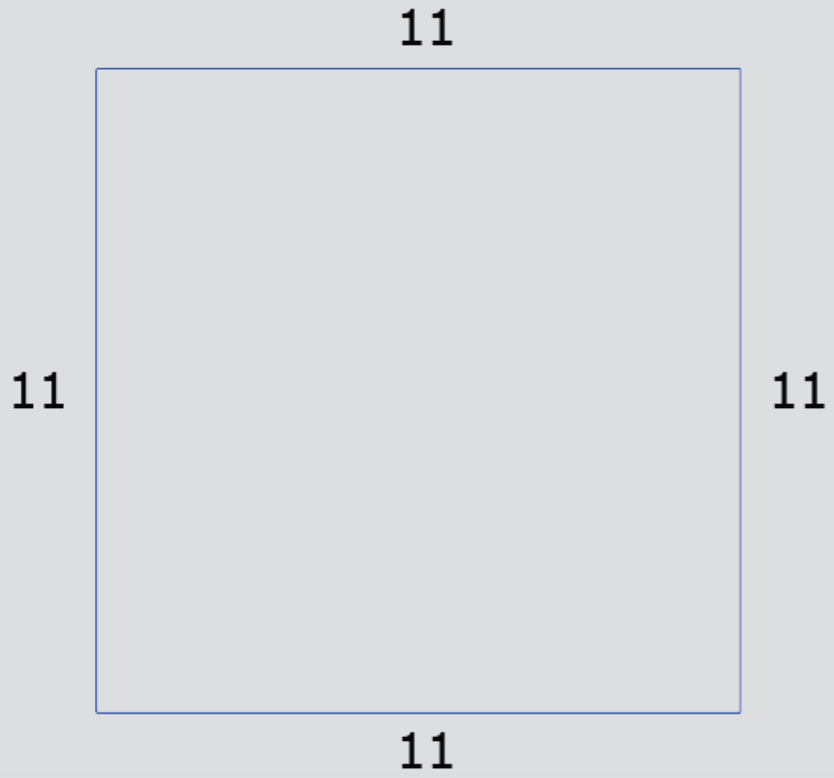


Min/Max Angles



Structured or Not

- Can the following set of connectors be made into a “quality” structured grid*?



* - Max skewness < 0.6, Max angle < 140 degrees, entirely quads

Structured or Not

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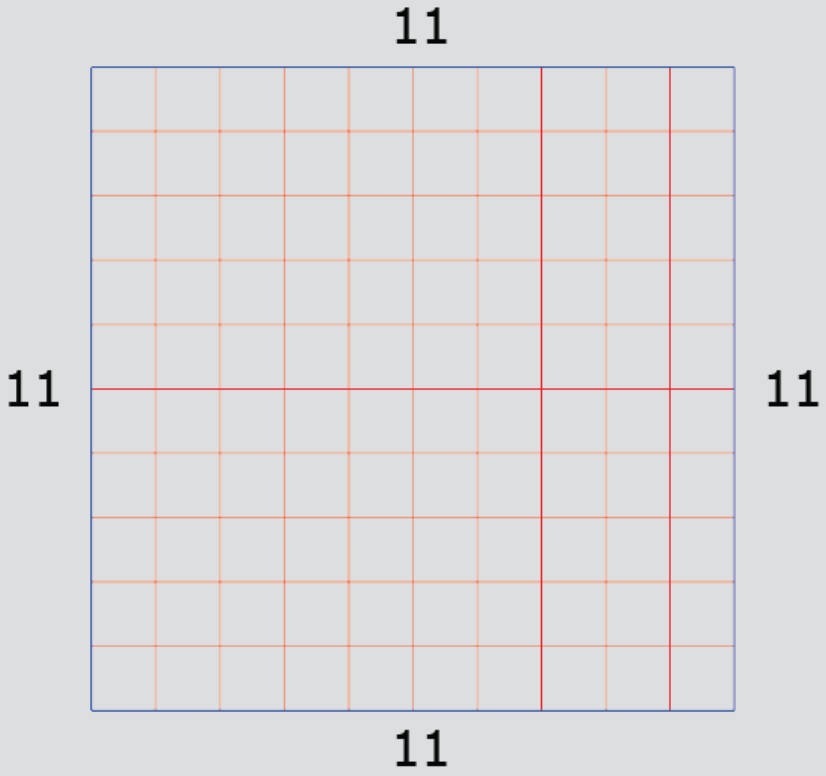

Yes!

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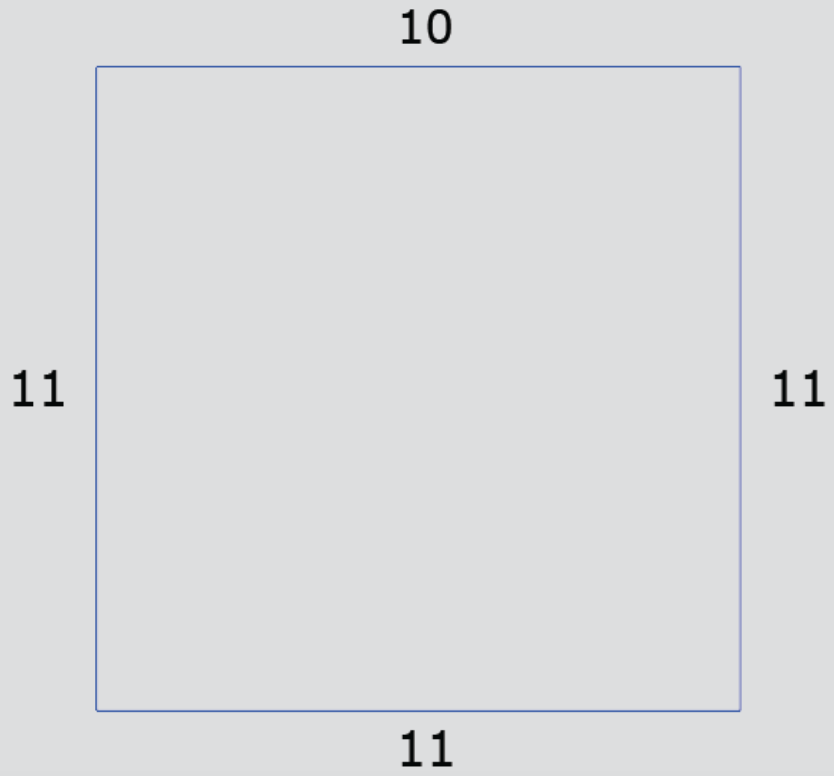

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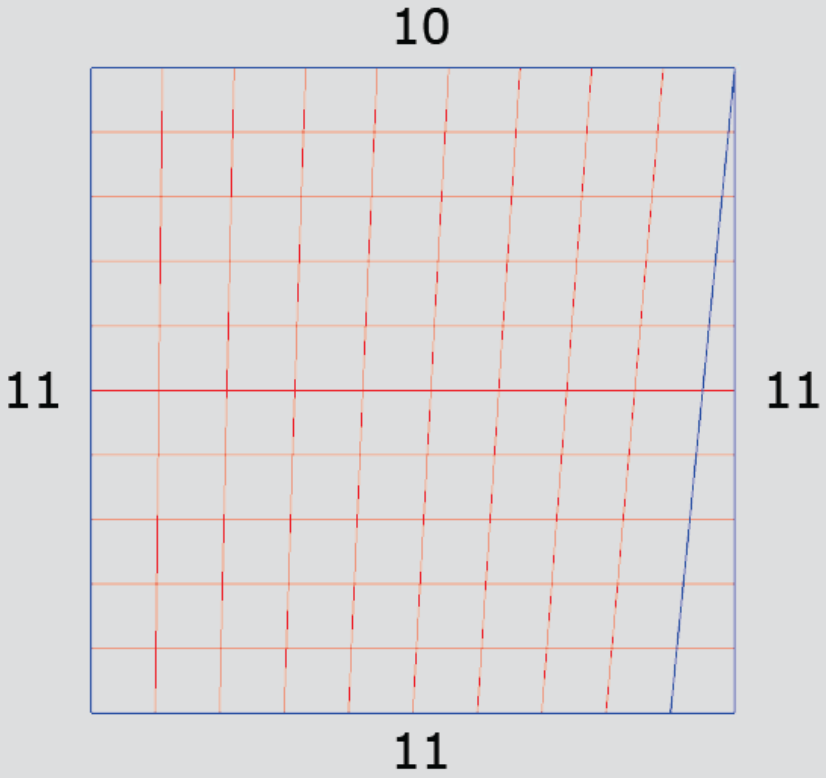

No, but sort of…

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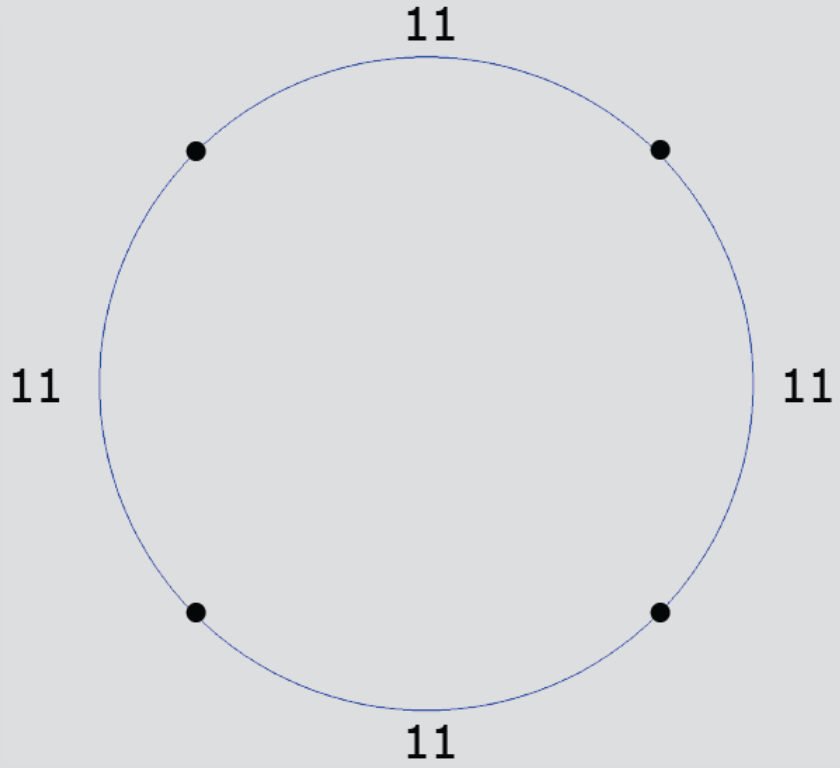

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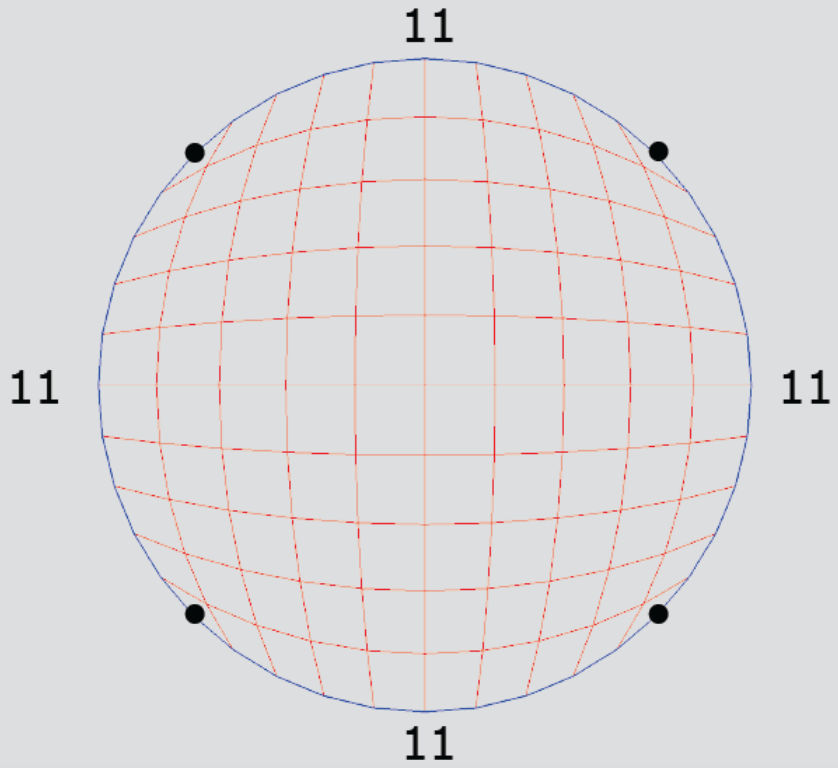

Not like this…

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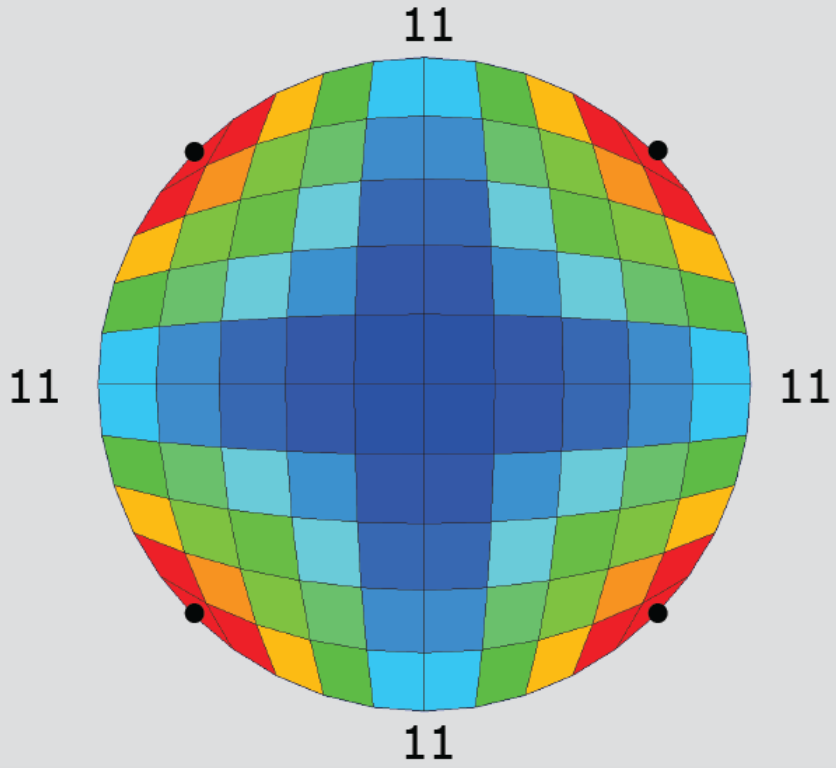

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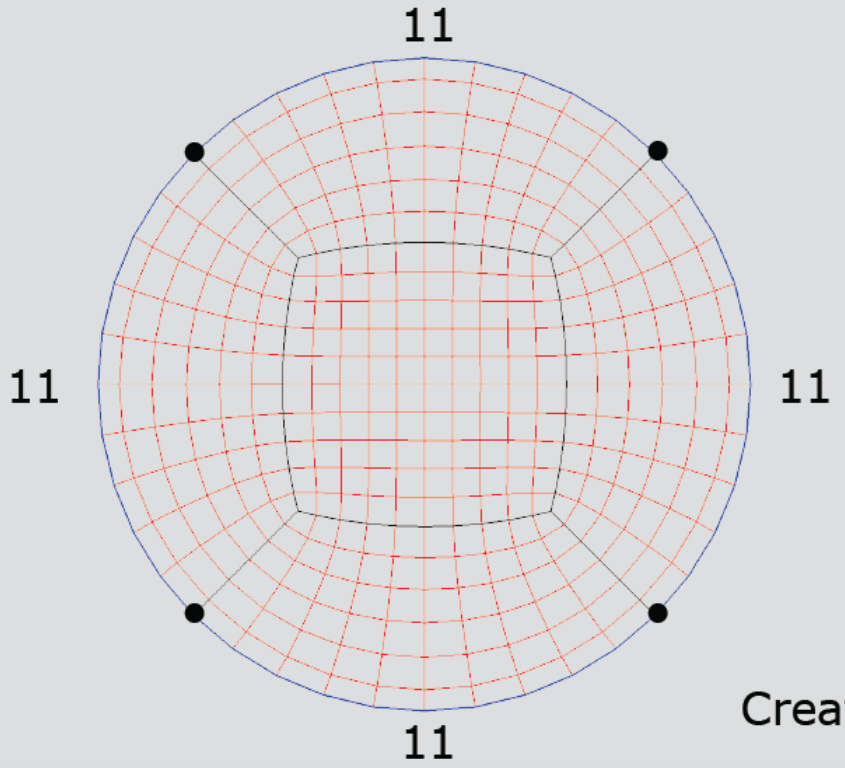

Yes!

CreateOH.glf

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Structured or Not

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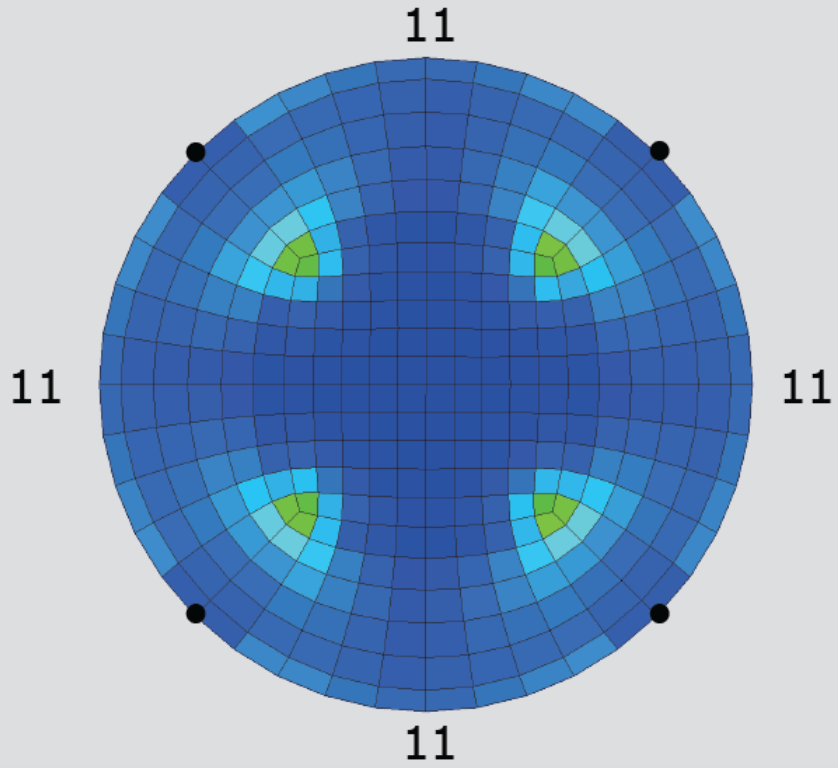

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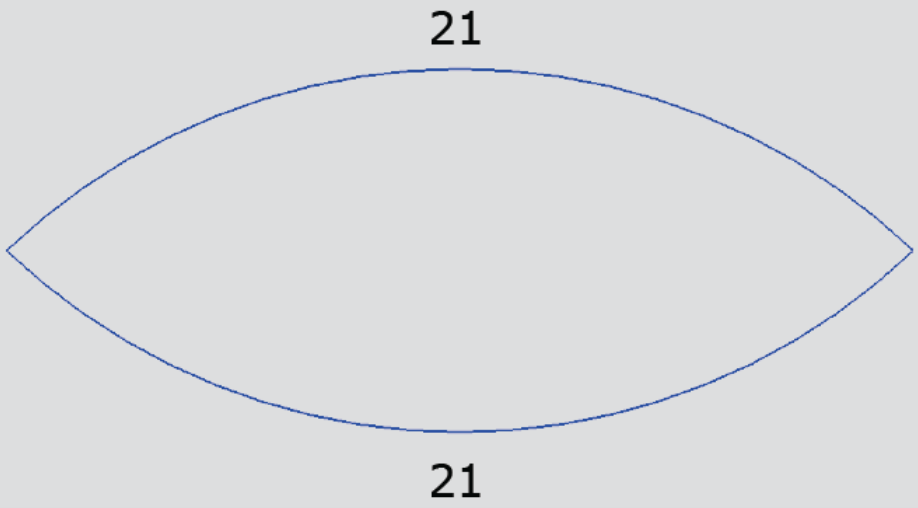

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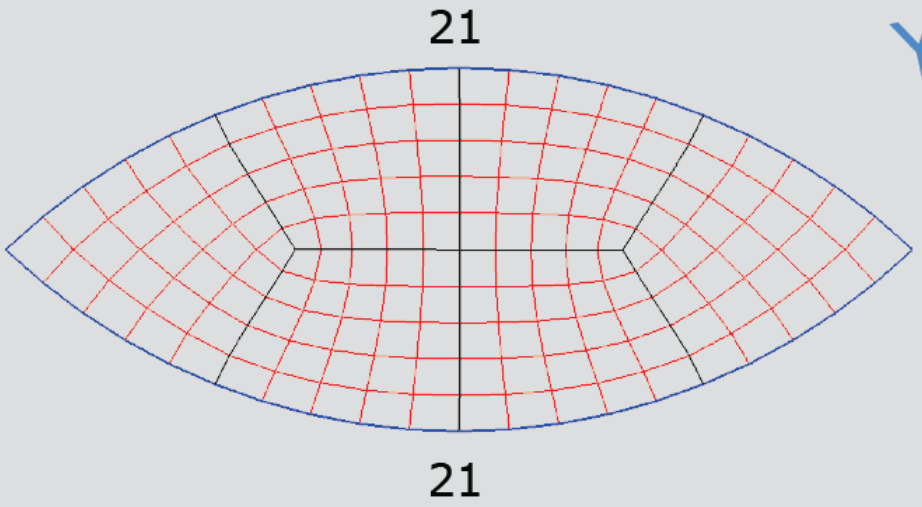

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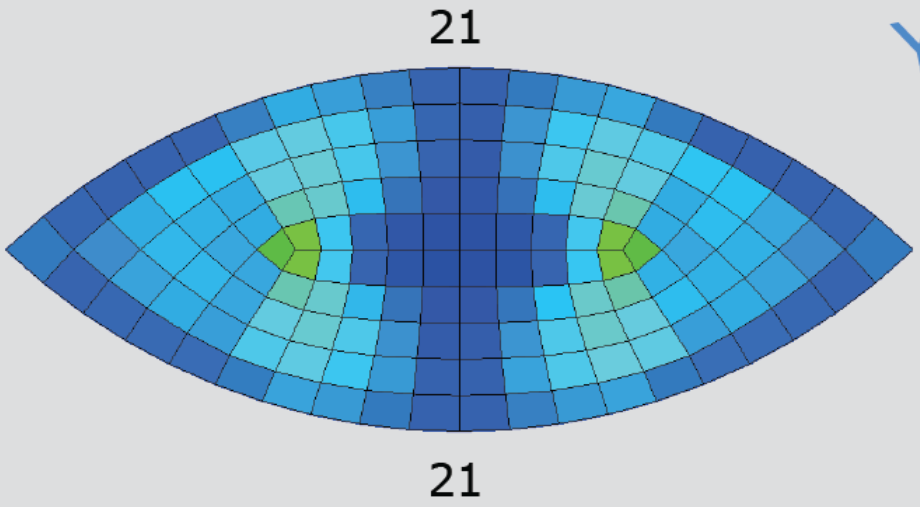

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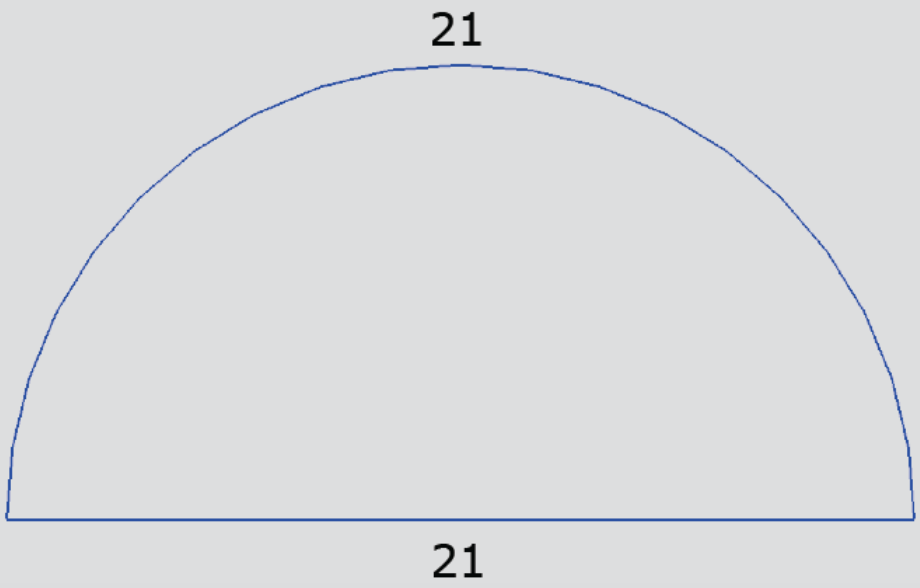

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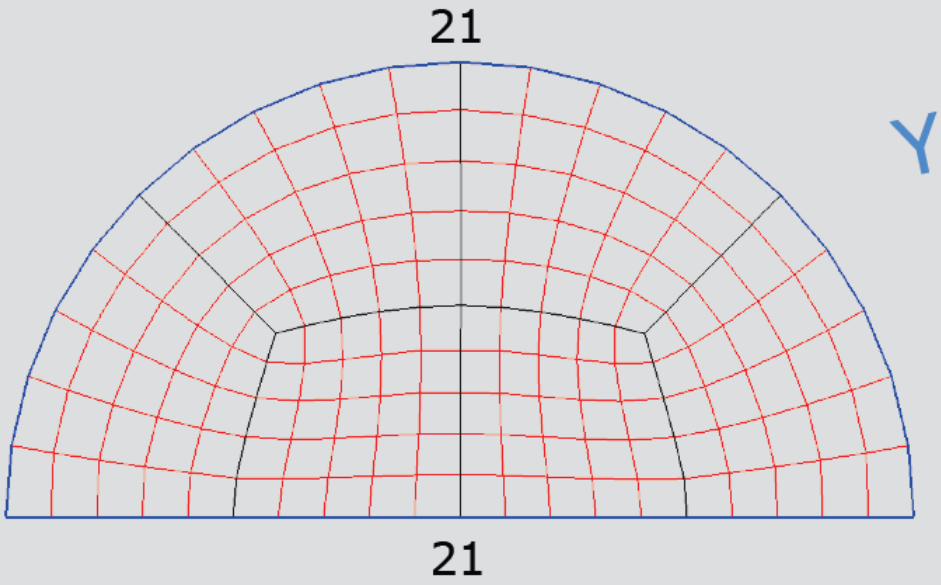

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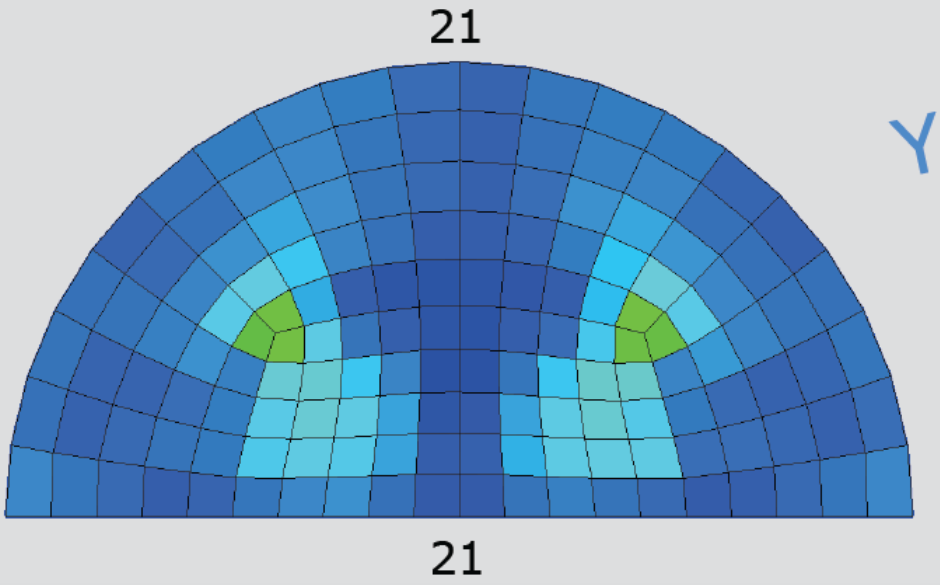

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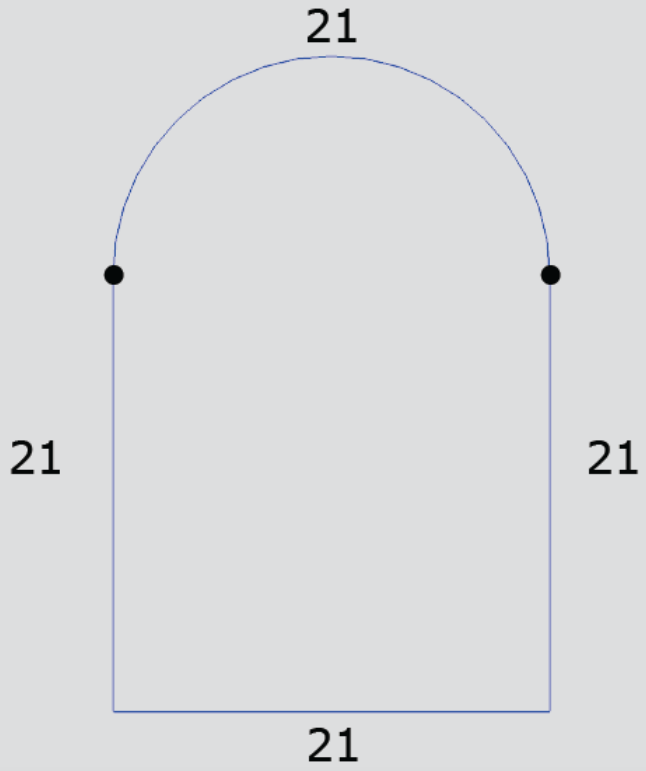

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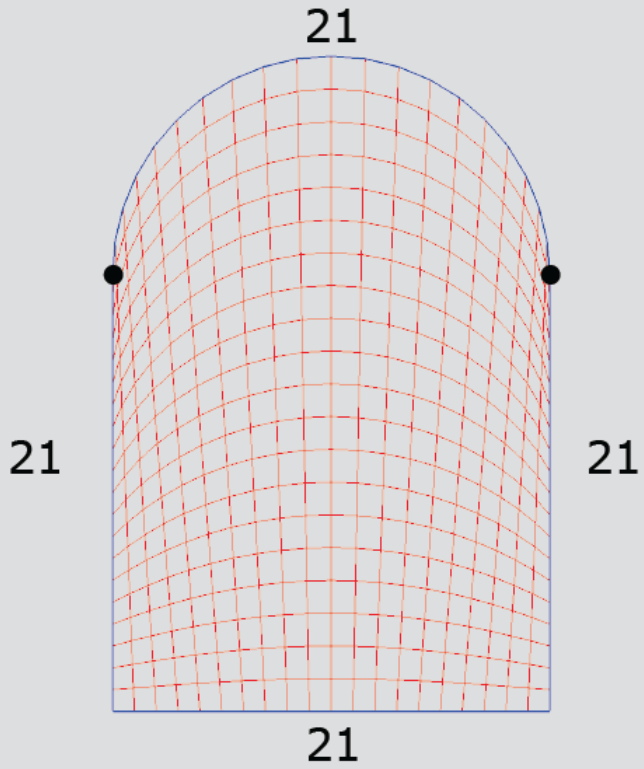

Not like this…

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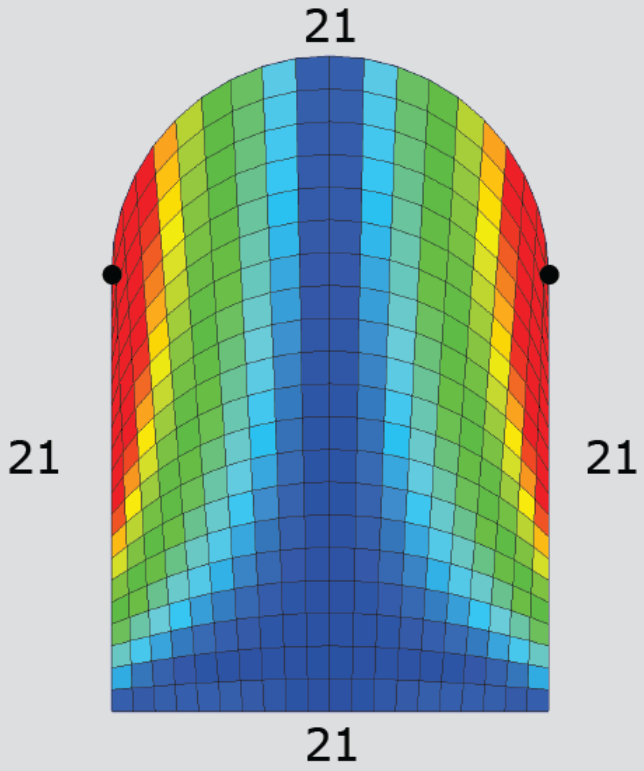

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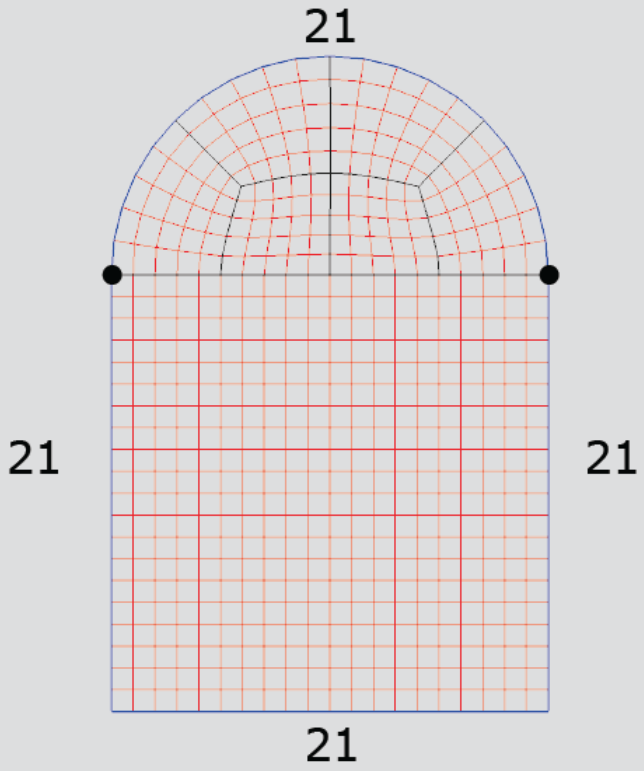

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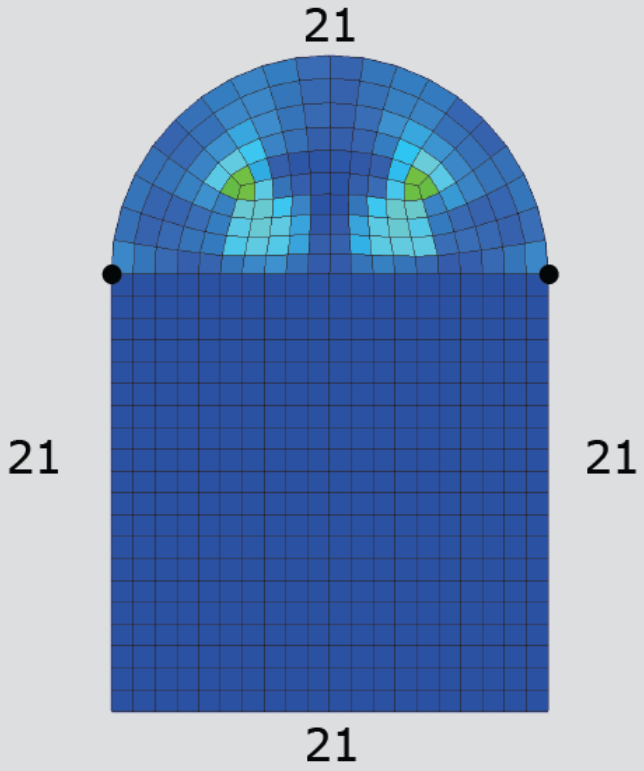

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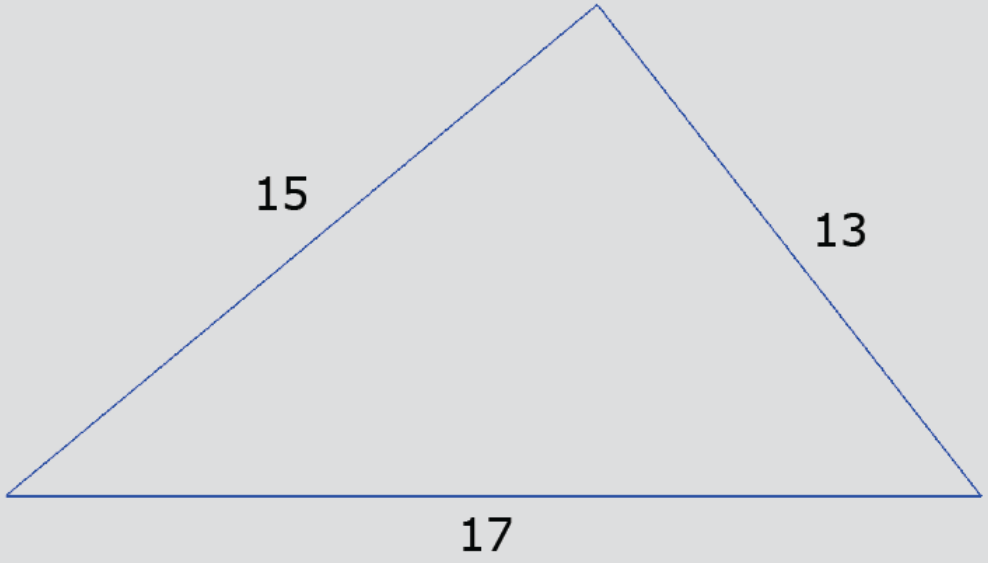

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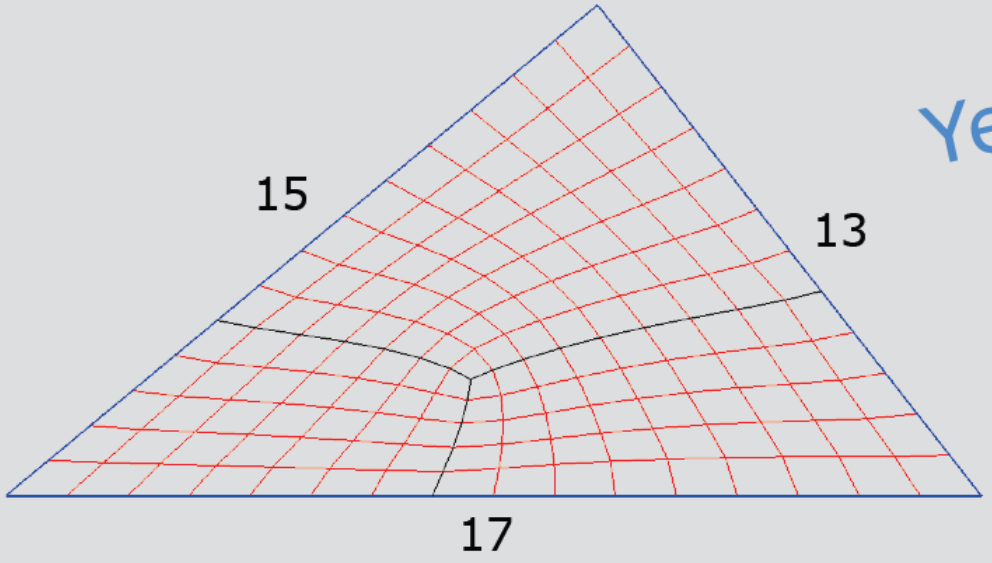

Yes!

TriQuad.glf

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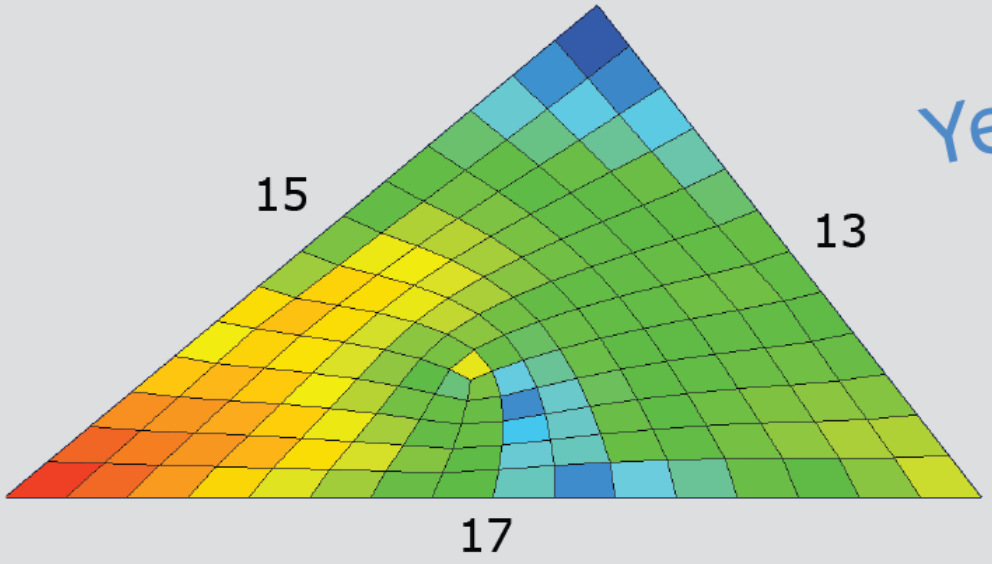

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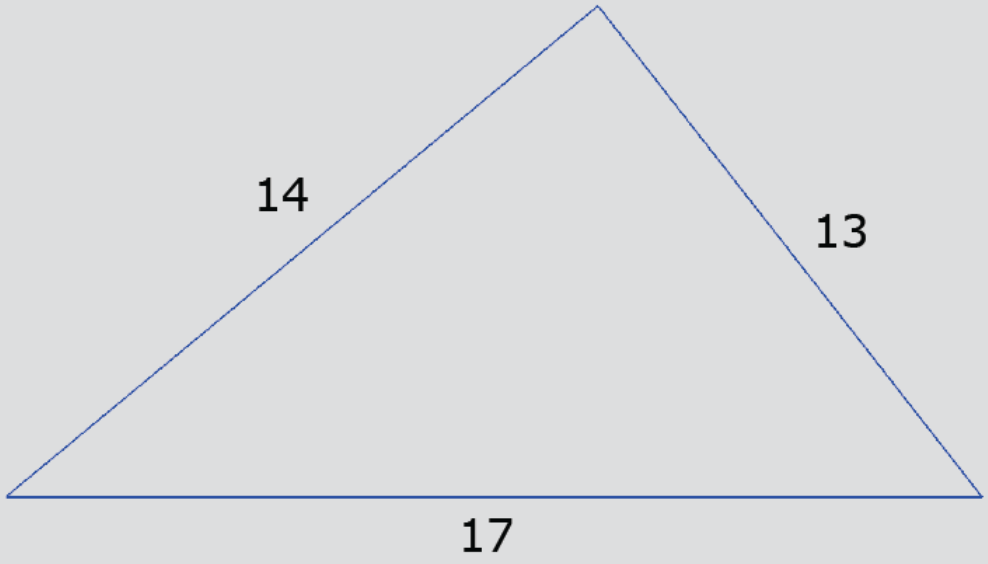

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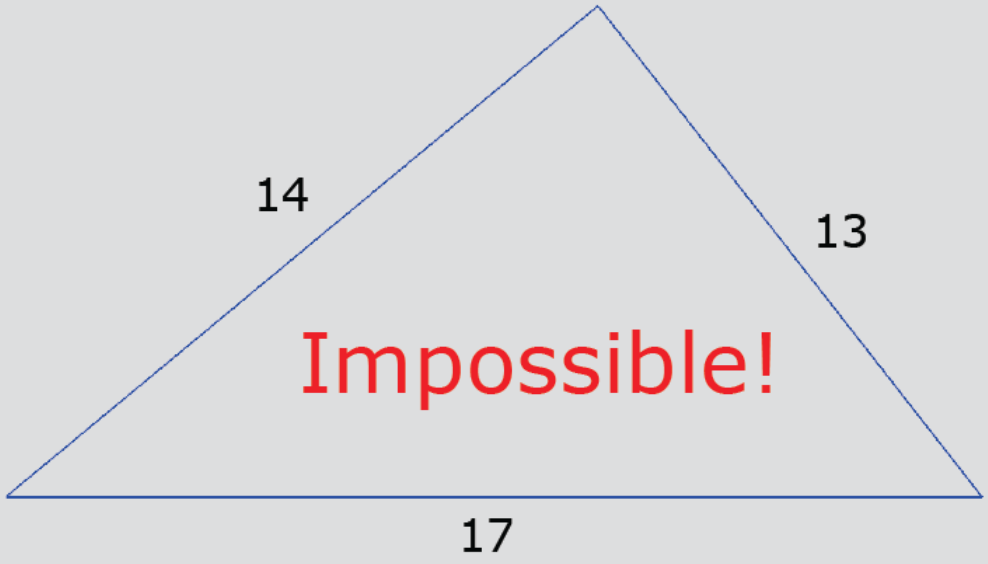

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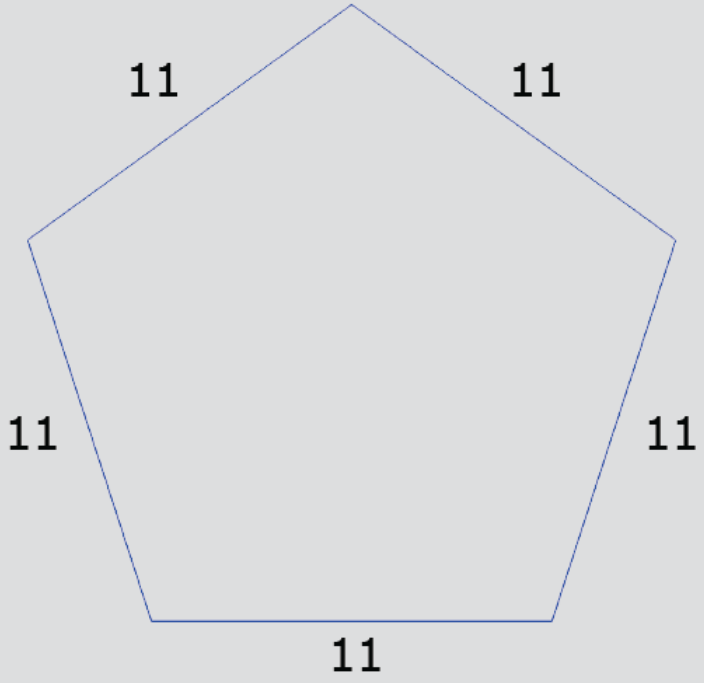

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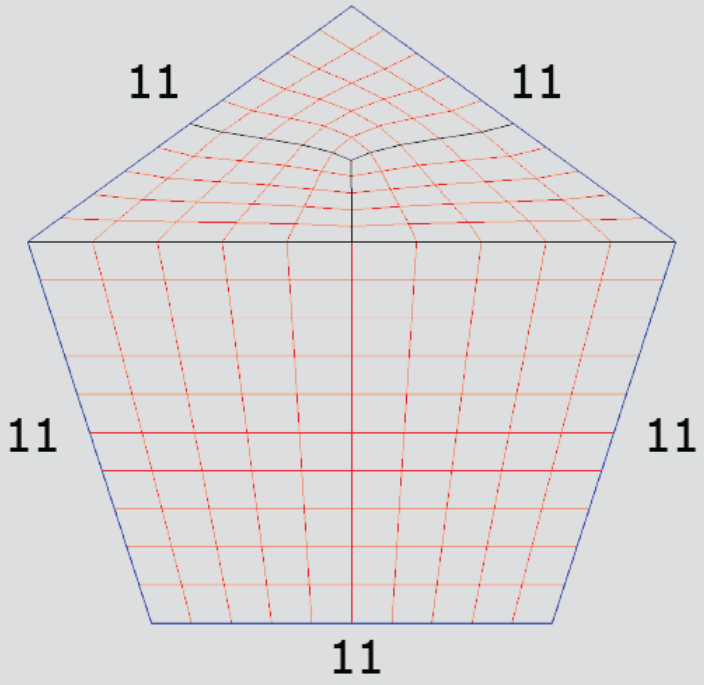

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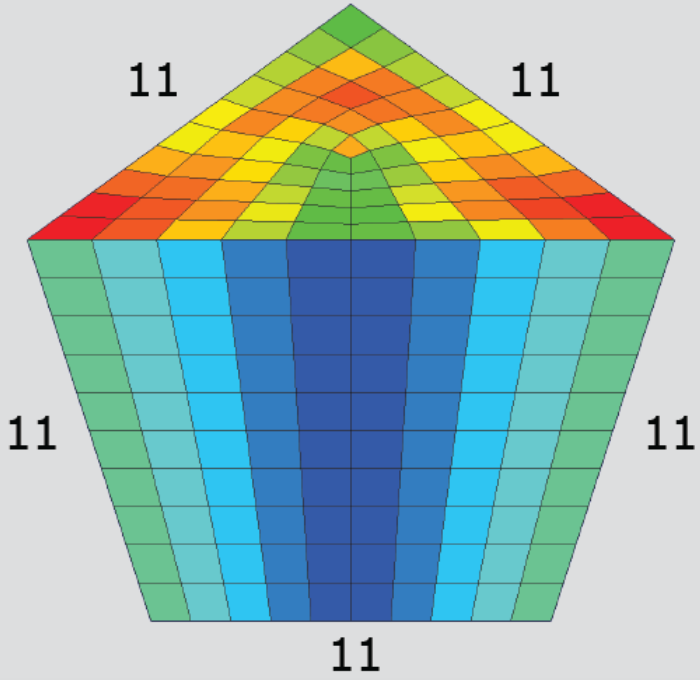

Barely…

We can do better

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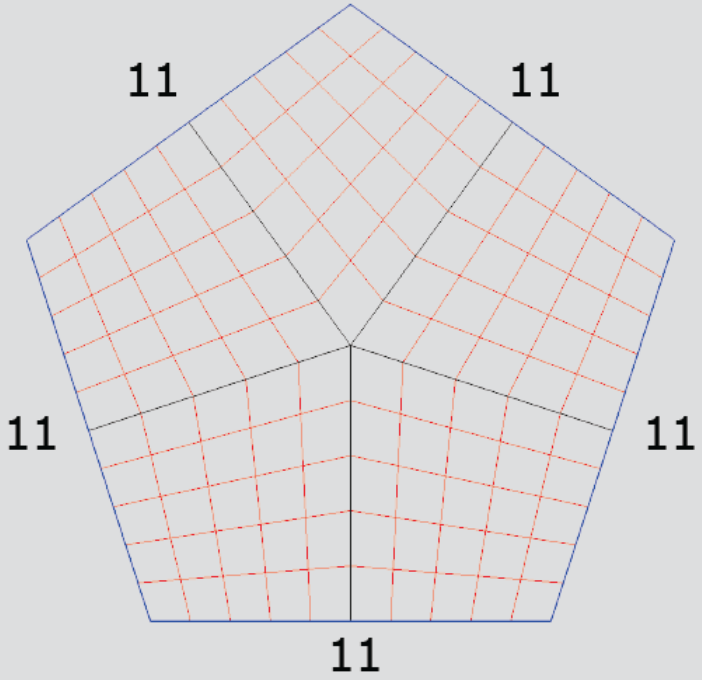

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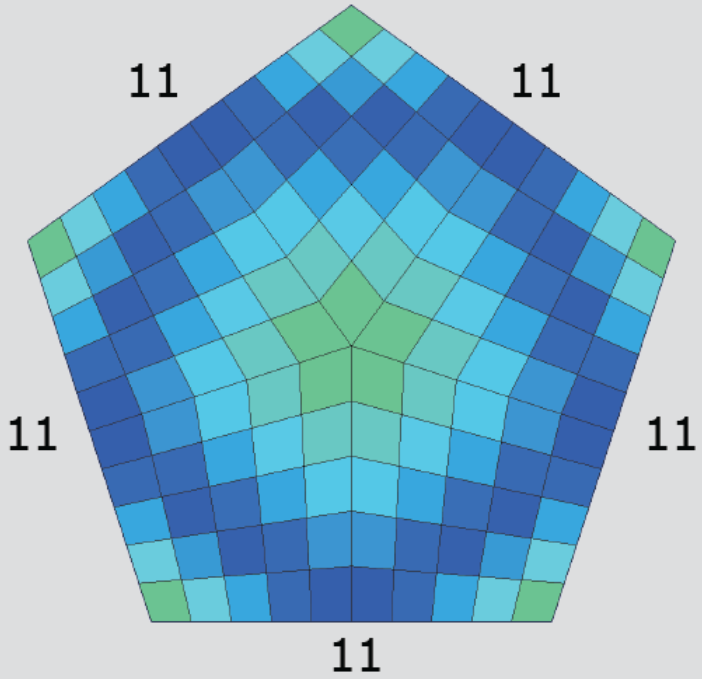

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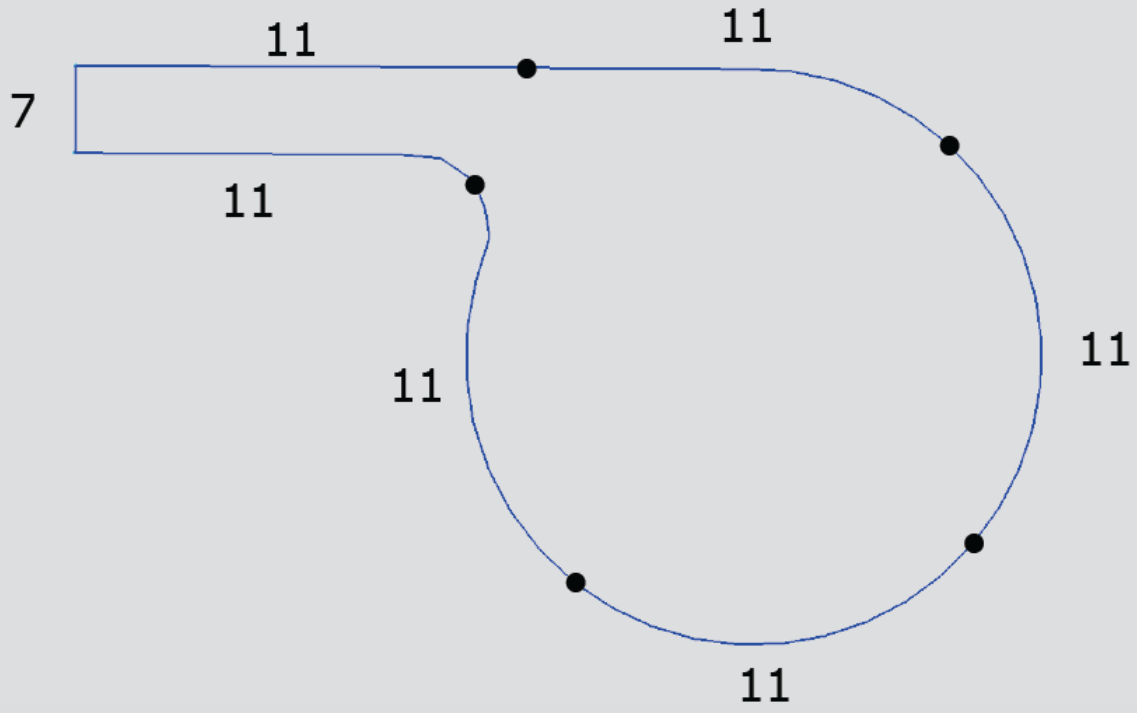

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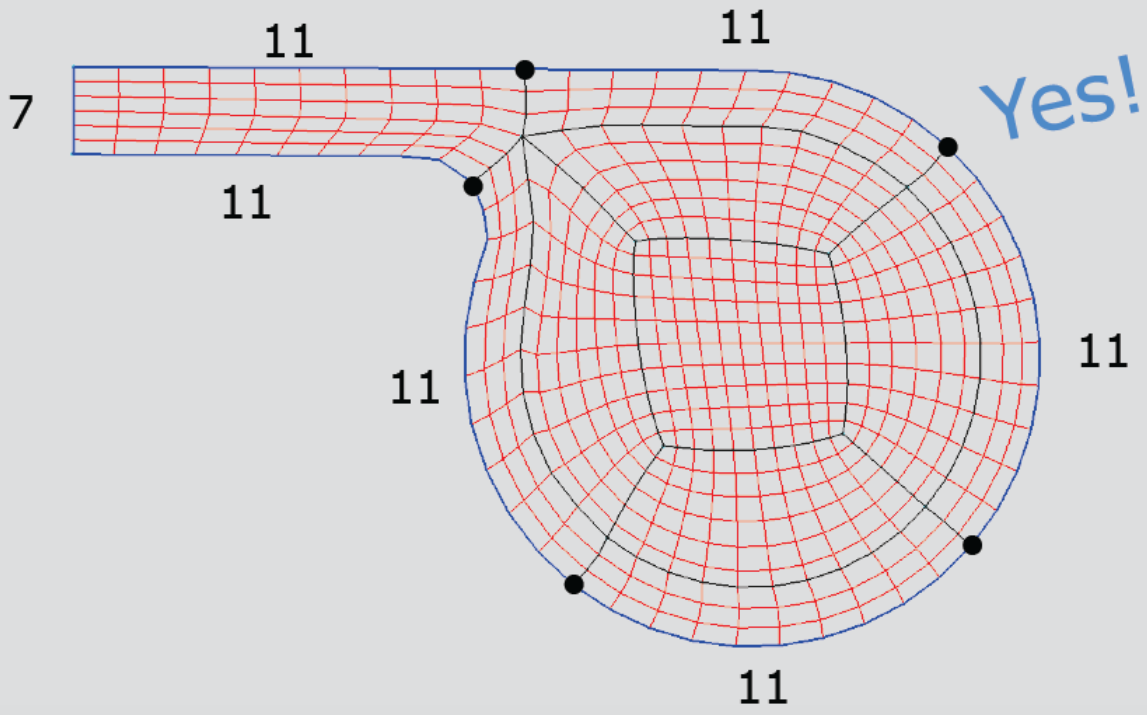

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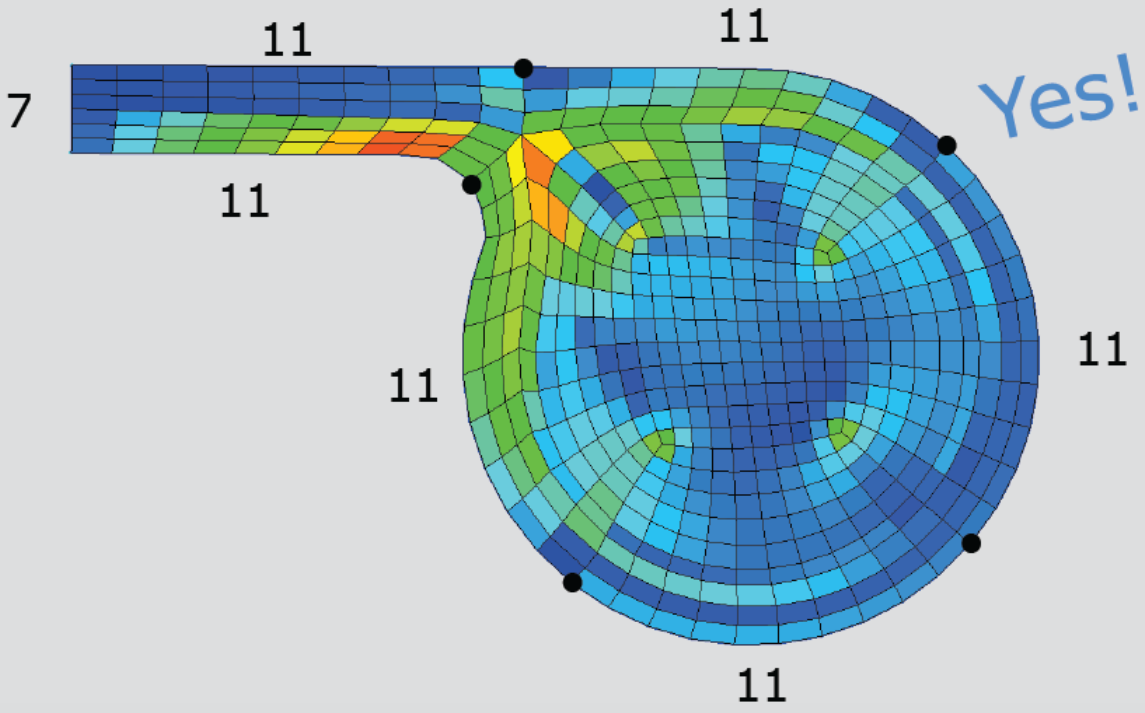

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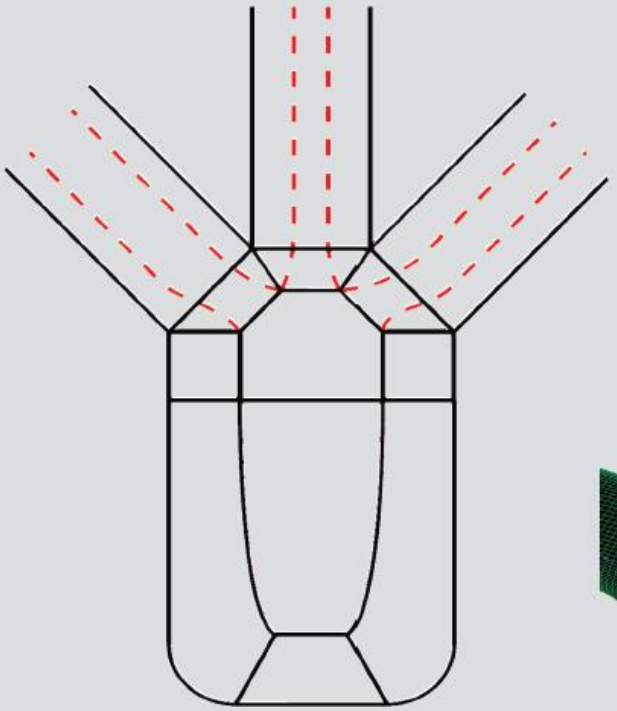
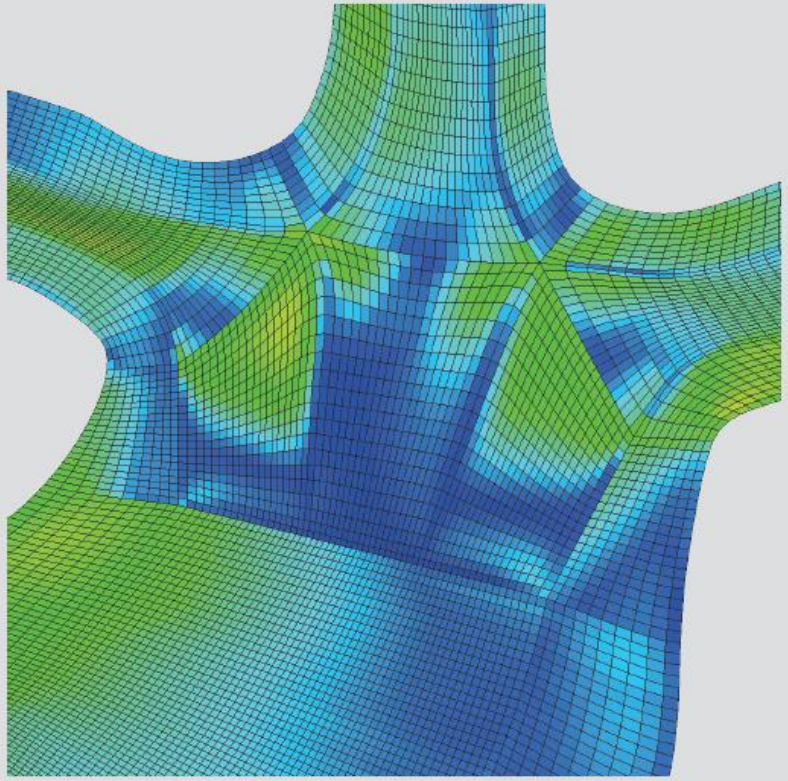
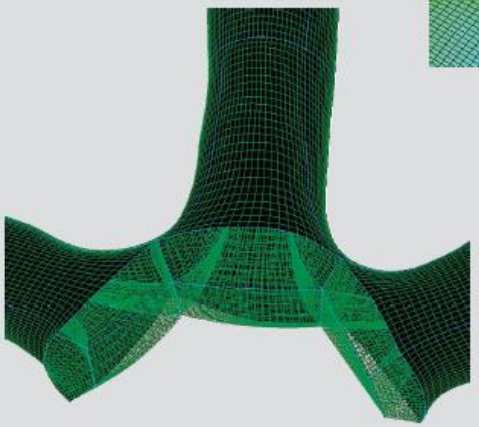
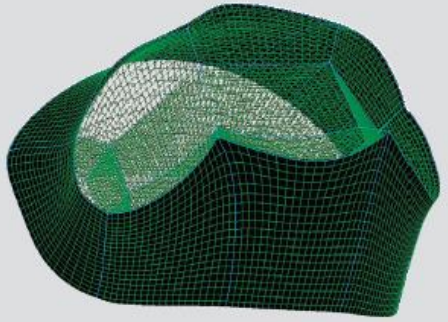
Blocking techniques

- Consider connectivity of ideal blocks
- 2D sketches can help visualize topology





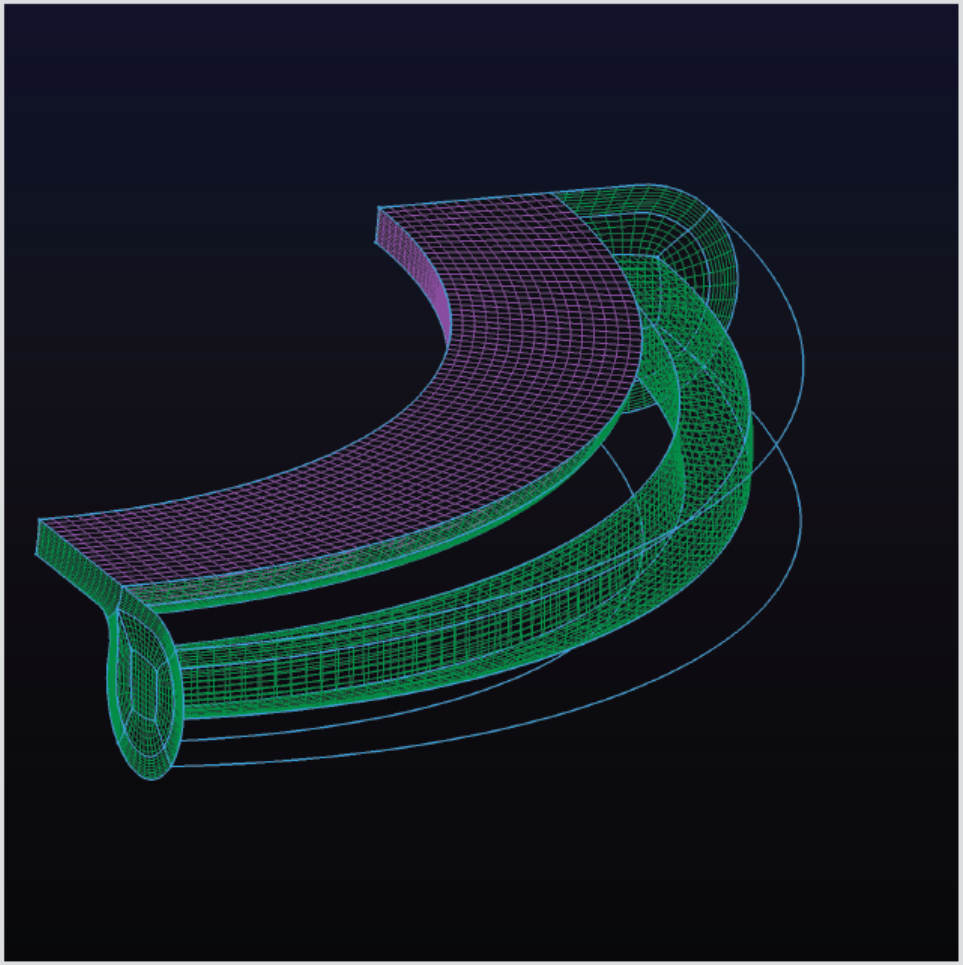




Constructing volume topology

- One of the most tedious aspects related to structured grid creation

- Methods:
  1. Manually sketching
  2. Copy & Paste
  3. Extrusions*
  4. Scripts



* - When applicable