Color Palette Tips
EnSight 9.1

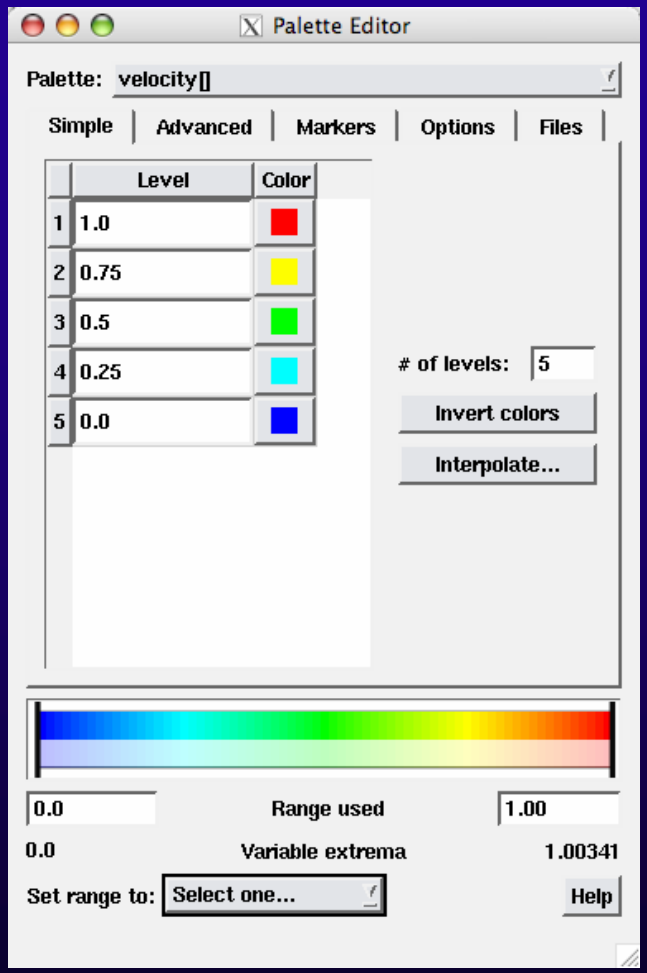
Computational Engineering International

Agenda

- Default Palette
- Editing the default palette
- Matching the color to the data
- Smoothed vs. per-element
- Adding more levels
- Seeing the Gradient
- Color blindness
- EnSight Included Palettes
- Palette transparency

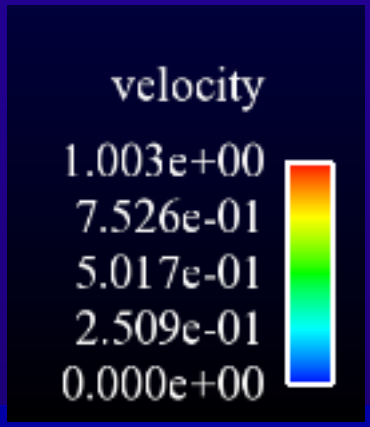
EnSight Default Palette

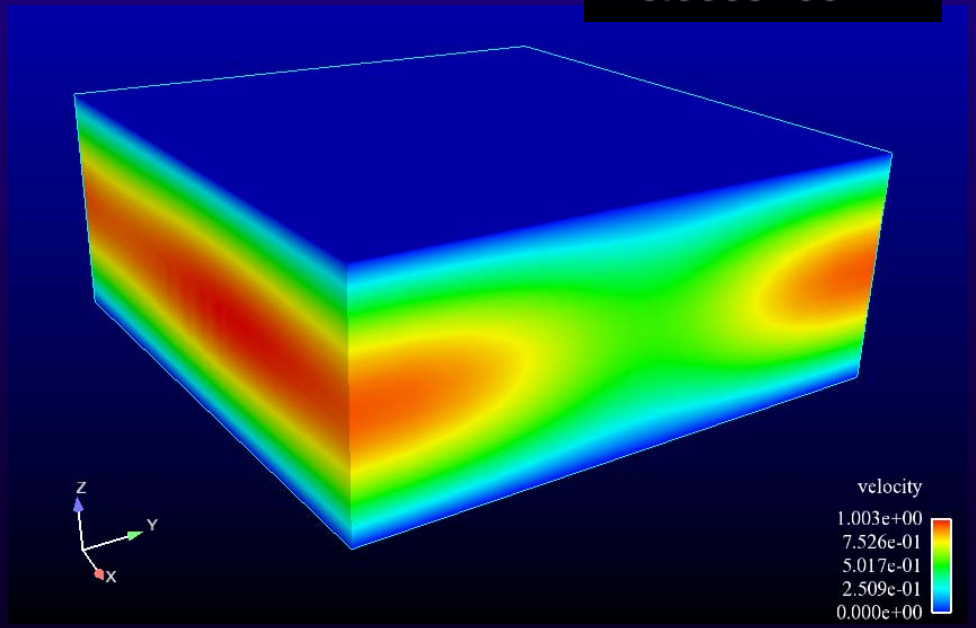
- Five levels
- Blue low
- Red high
- Advantage: Simple, clean
- Disadvantage: all colors are interesting.



Why don’t you want all colors interesting?

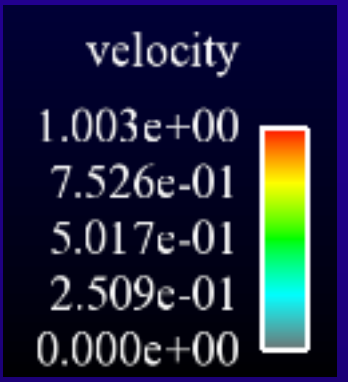
- The human eye is attracted to vibrant colors
- The default palette consists of 5 vibrant, saturated colors
- Zero should be uninteresting

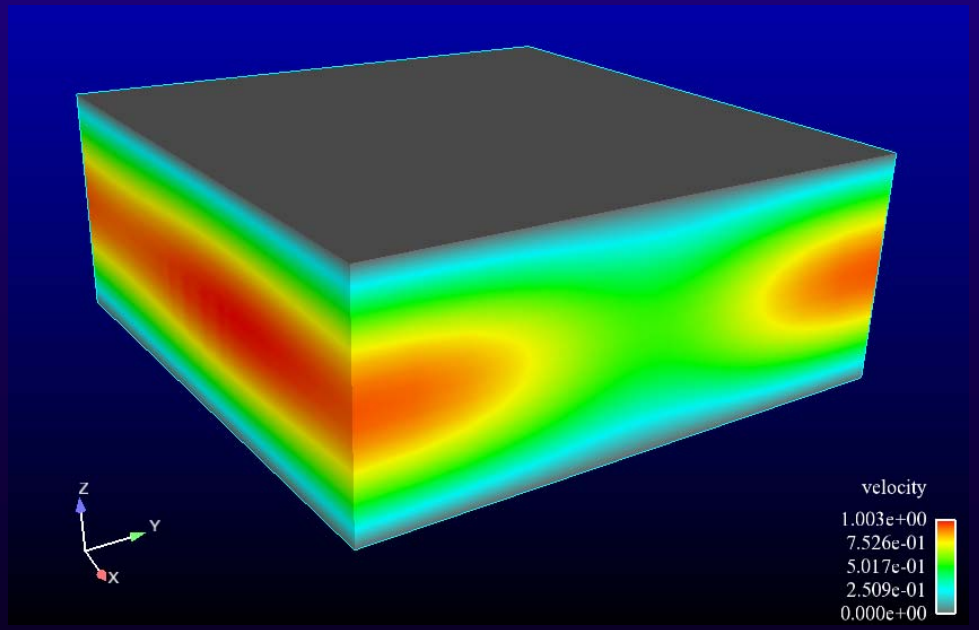




Notice how the low value zero is now uninteresting

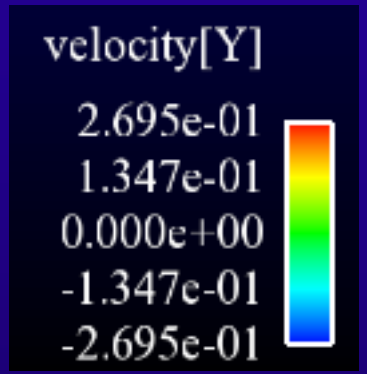
- Take advantage of the human eye
- Communicate more quickly and effectively

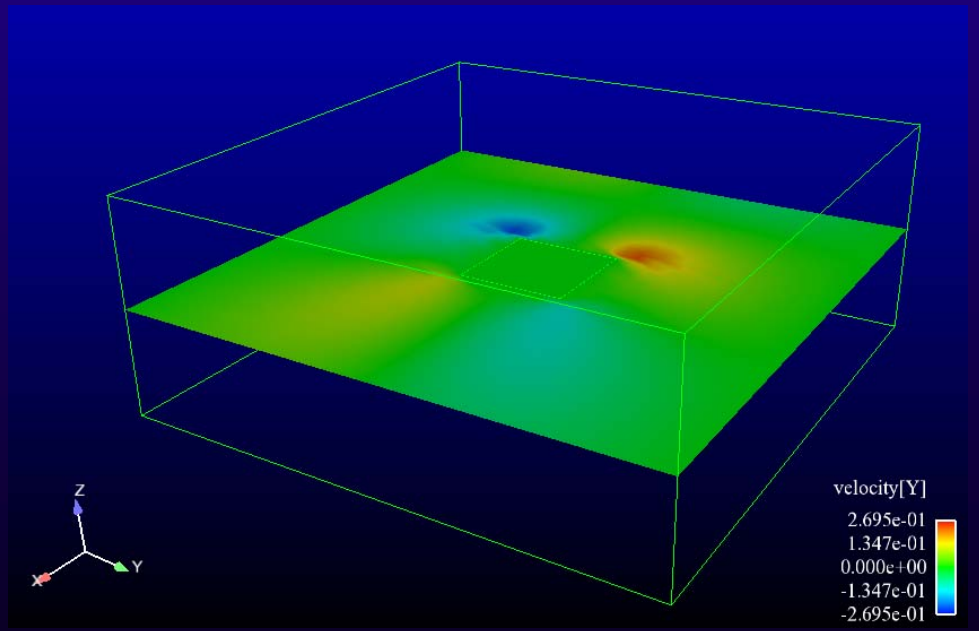




Zero between two extrema

- Saturated Green is too interesting
- Gray it out!

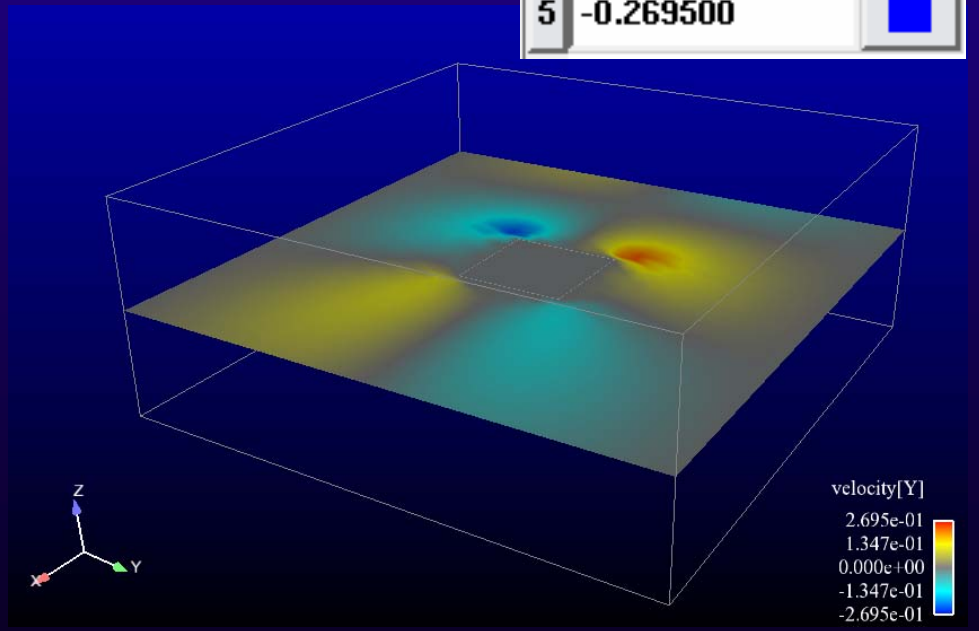




Gray Zero highlights the extrema

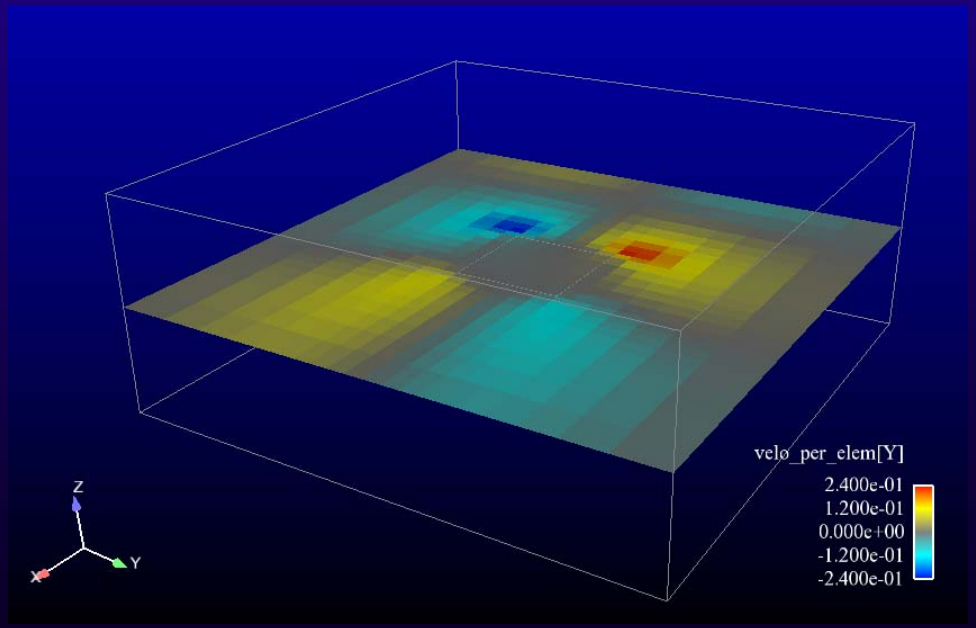
- Don’t make your observer work hard to understand
- Make Important values have Important colors!

	Level	Color
1	0.269500	
2	0.134750	
3	0.0	
4	-0.134750	
5	-0.269500	



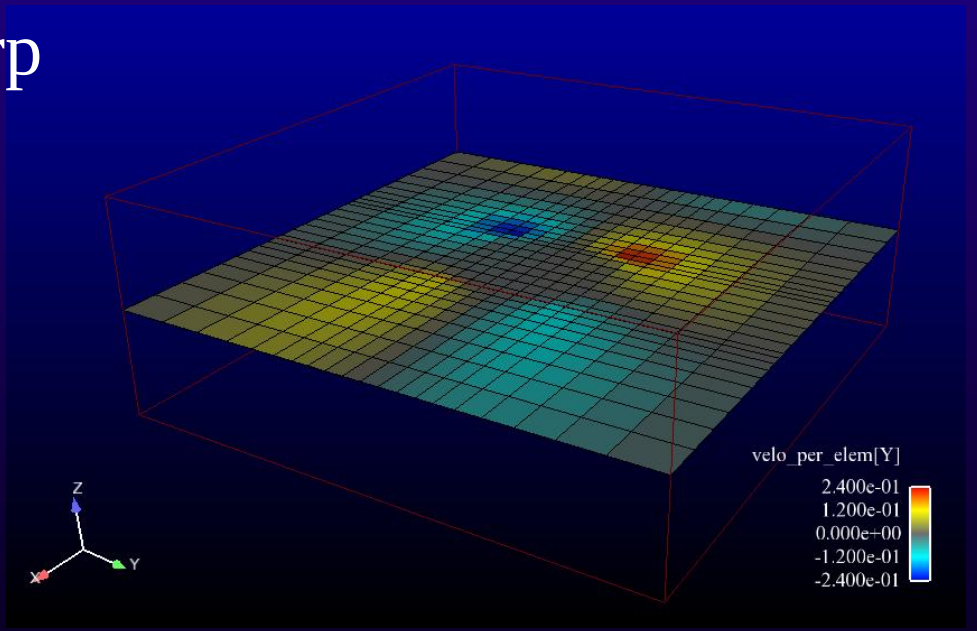
Why do my Per-Element variables look ‘chunky’

- Per element values: one color for one element
- No interpolation



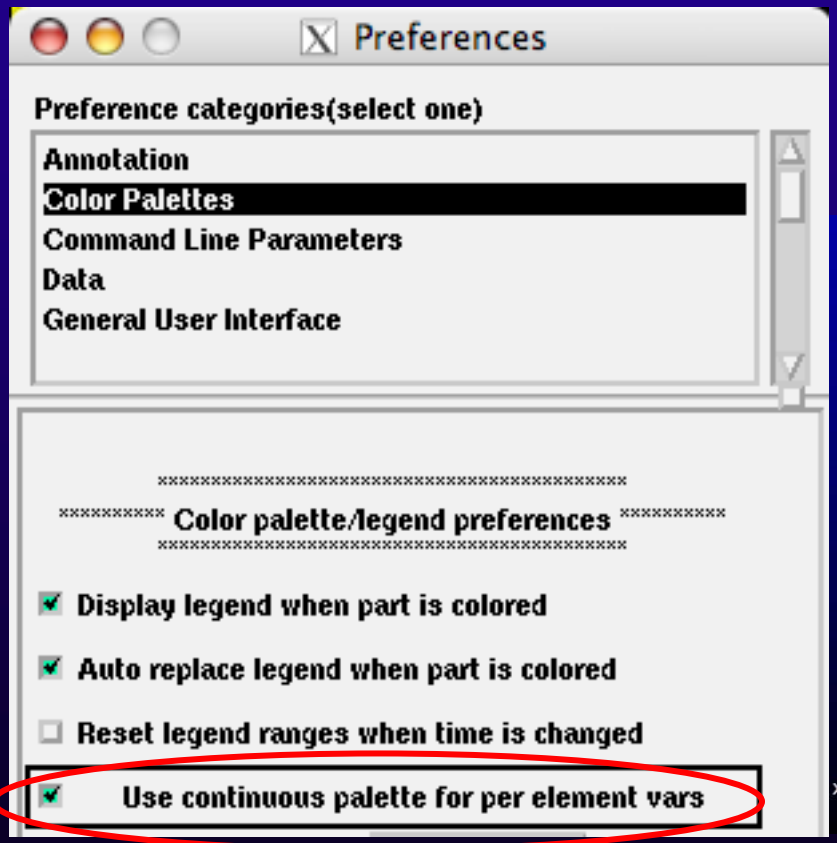
Look at the coloring on each element

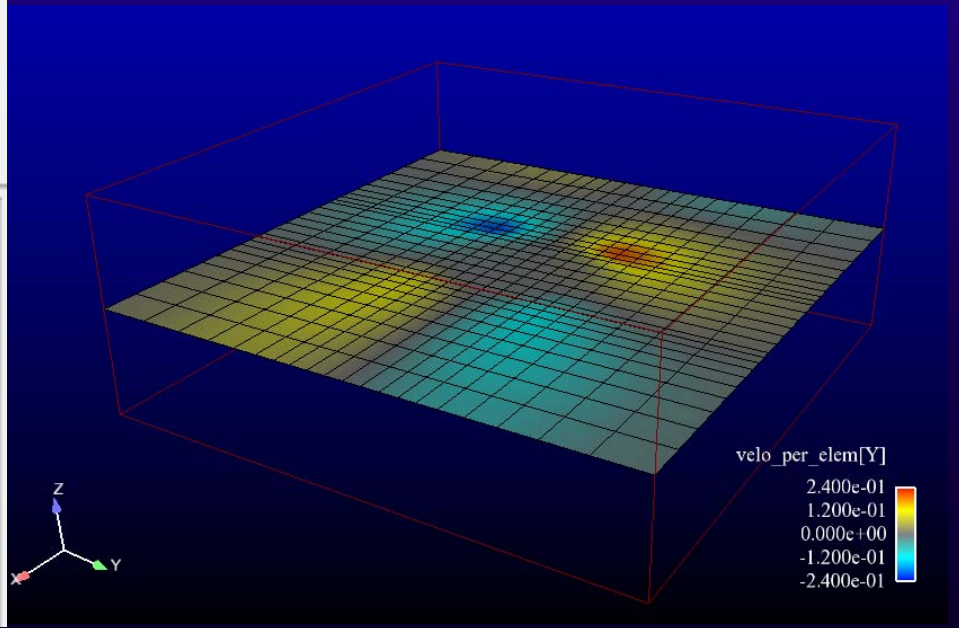
- See that each element has one color
- No blending between elements
- Coarse mesh with sharp gradient is ‘chunky’



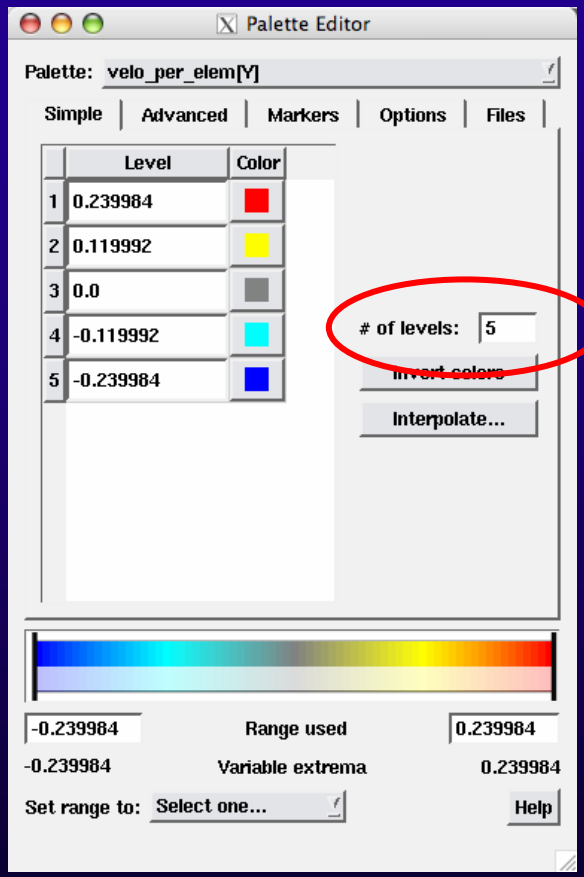
EnSight can interpolate per element variables, smoothing the coloration

- Edit>Preferences Color Palettes

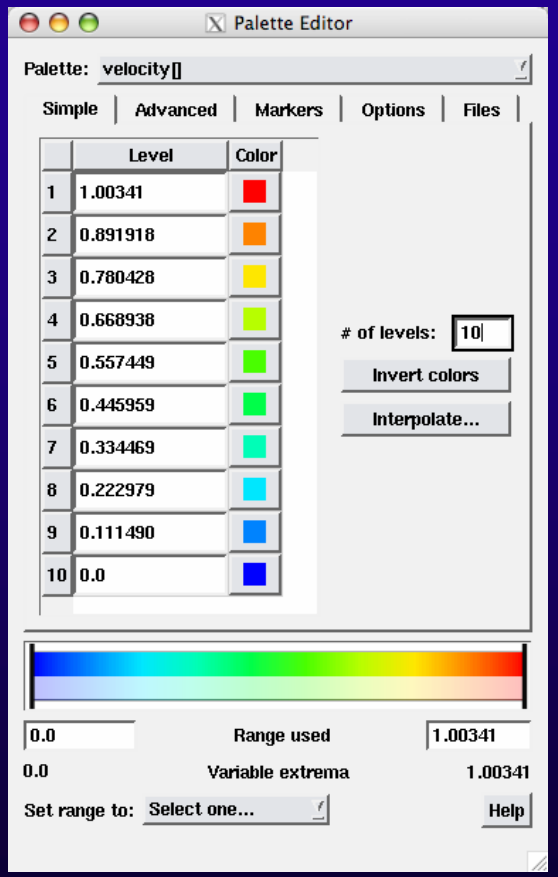




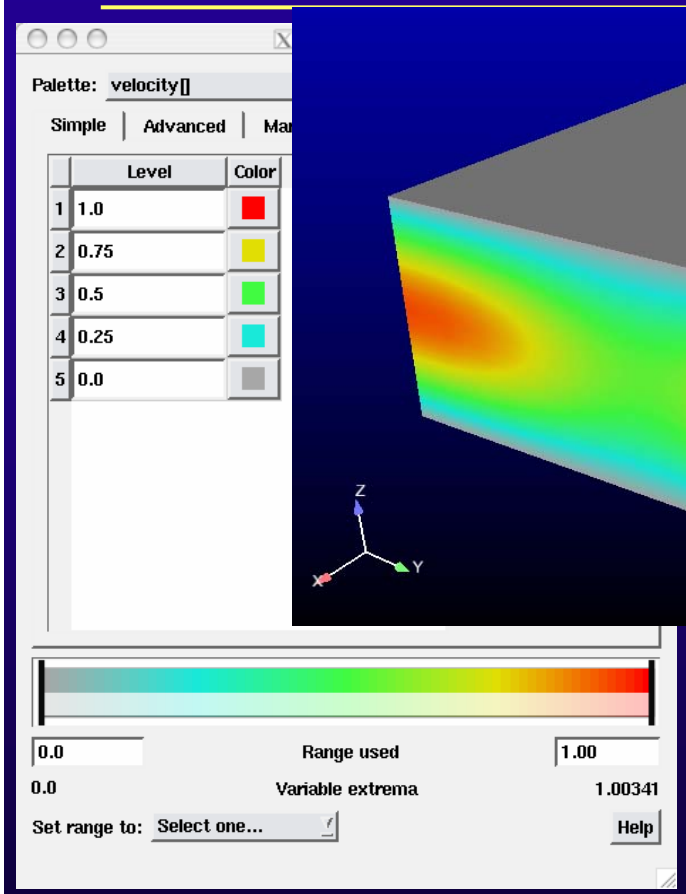
When should I add more levels?

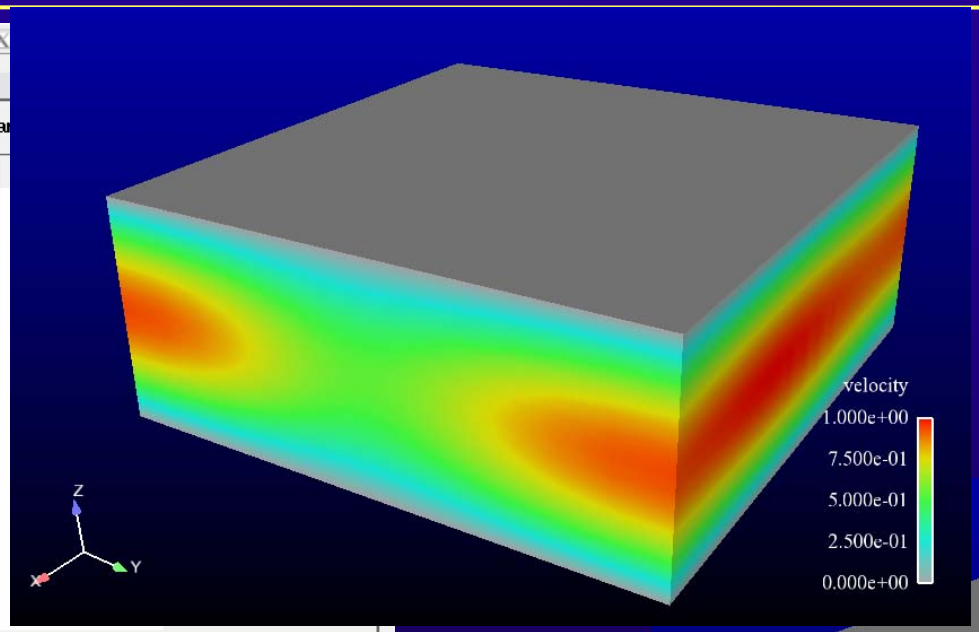


- The default is 5
- The max is 21
- When is more better?

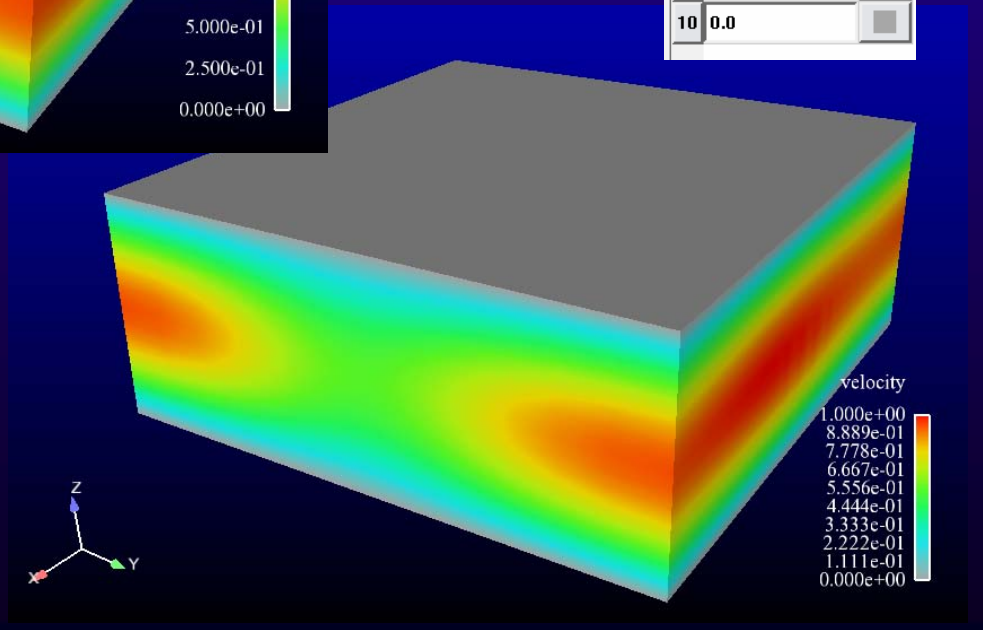


Are more levels ‘better’?





	Level	Color
1	1.0	
2	0.888889	
3	0.777778	
4	0.666667	
5	0.555556	
6	0.444444	
7	0.333333	
8	0.222222	
9	0.111111	
10	0.0	

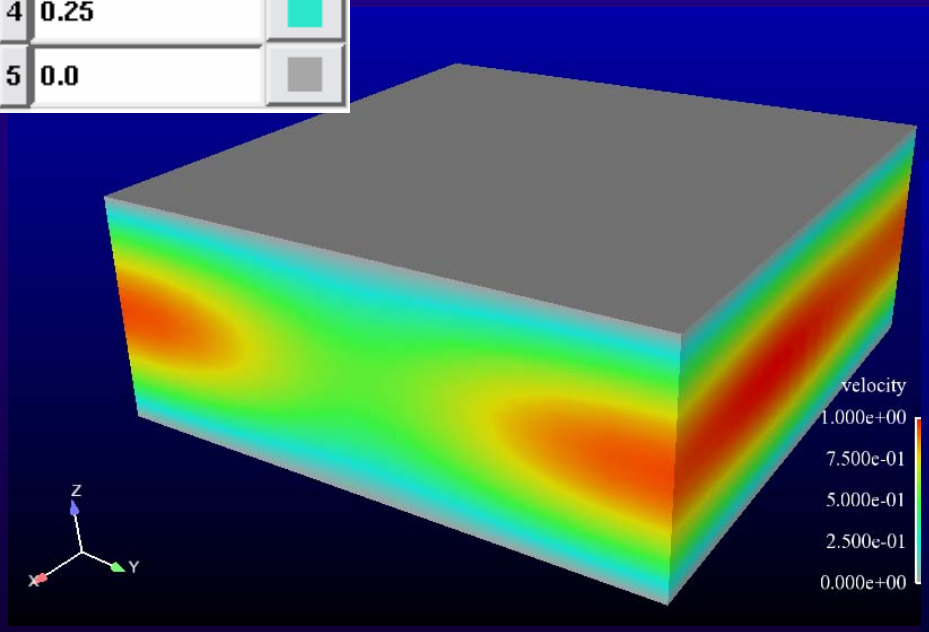


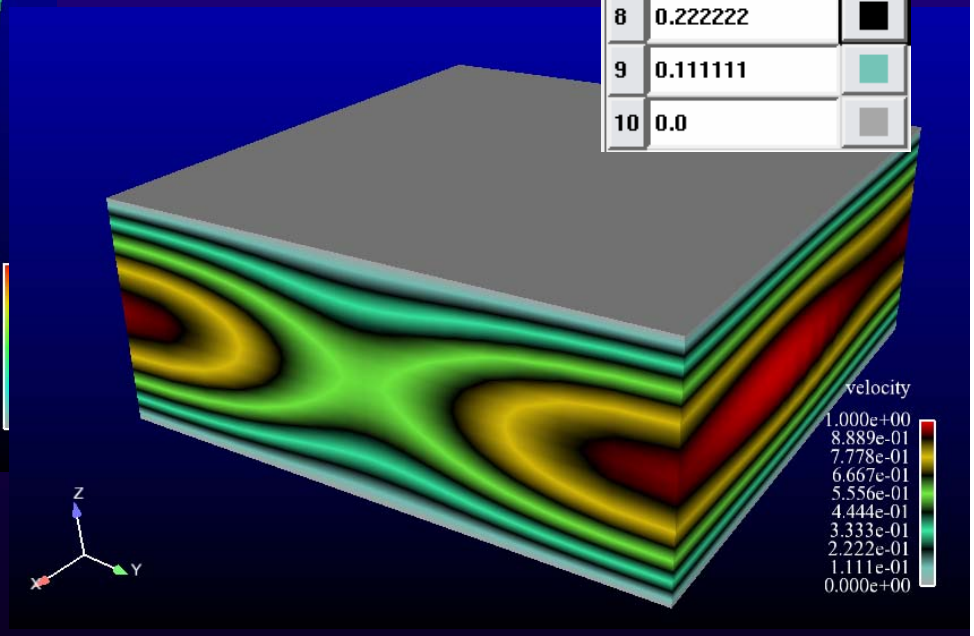
What if we make every other level black?

	Level	Color
1	1.0	
2	0.75	
3	0.5	
4	0.25	
5	0.0	

- See gradients in a dramatic fashion.

	Level	Color
1	1.0	
2	0.888889	
3	0.777778	
4	0.666667	
5	0.555556	
6	0.444444	
7	0.333333	
8	0.222222	
9	0.111111	
10	0.0	



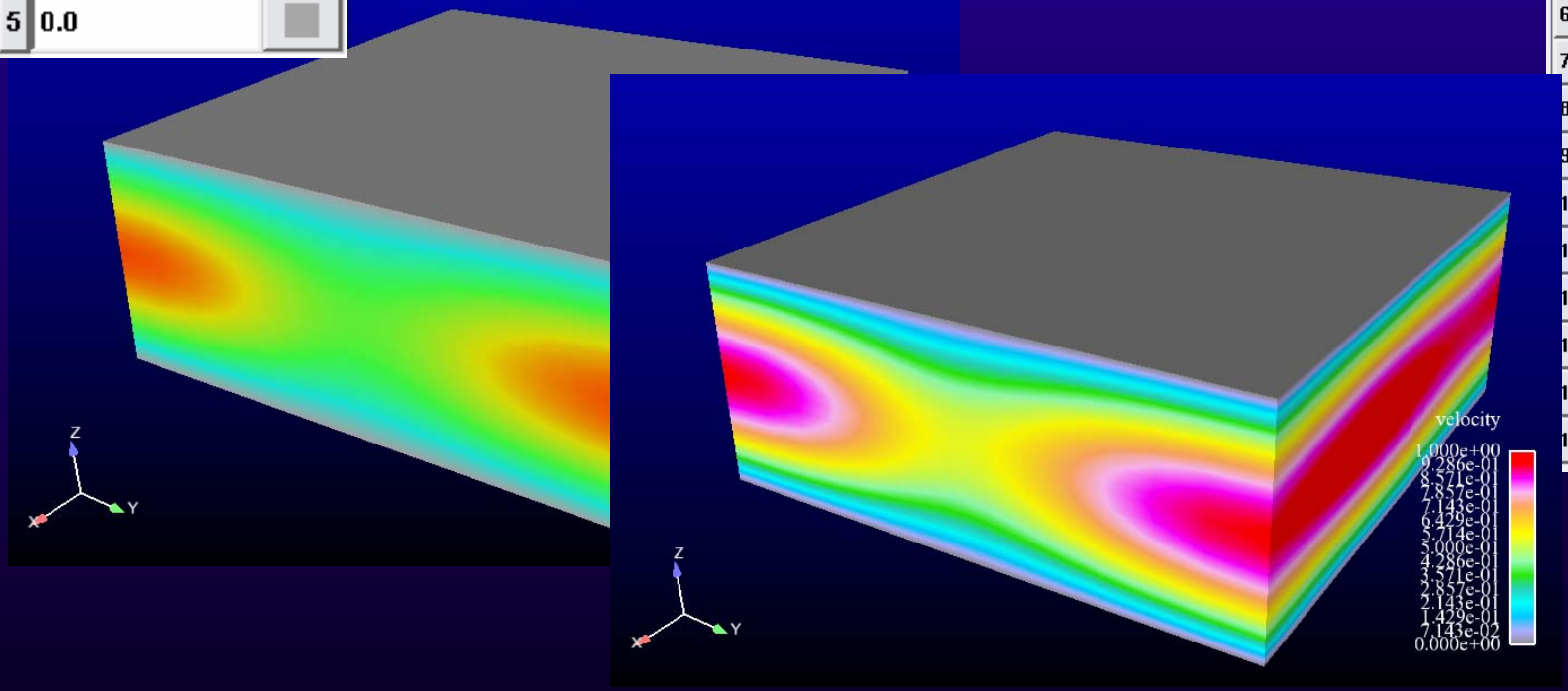


Light/Dark banded colors are more subtle

	Level	Color
1	1.0	
2	0.75	
3	0.5	
4	0.25	
5	0.0	

- every other band is light dark of the same color
- Use both sides of your brain!

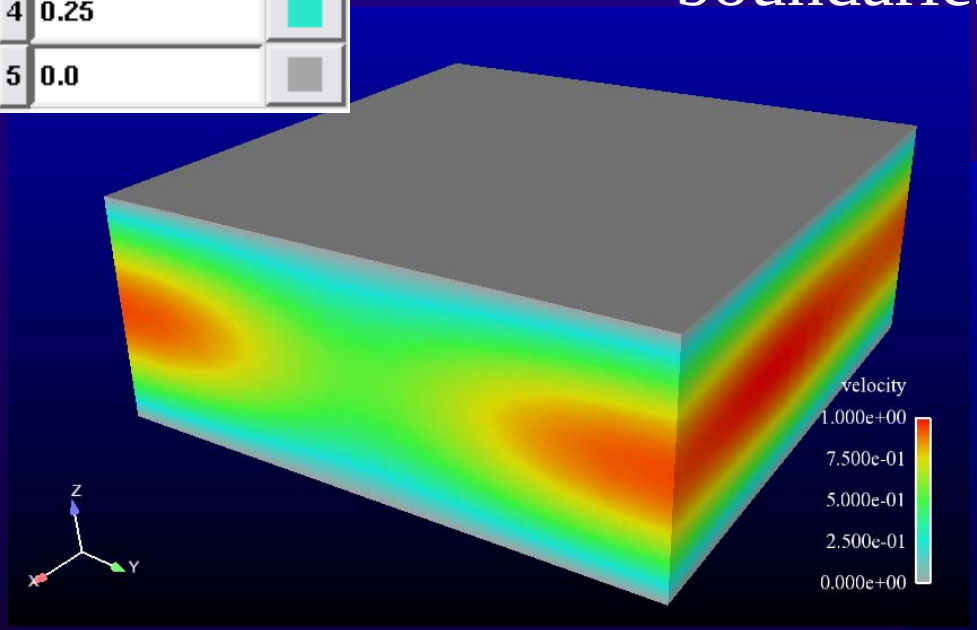
	Level	Color
1	1.0	
2	0.928571	
3	0.857143	
4	0.785714	
5	0.714286	
6	0.642857	
7	0.571429	
8	0.5	
9	0.428571	
10	0.357143	
11	0.285714	
12	0.214286	
13	0.142857	
14	0.0714286	
15	0.0	

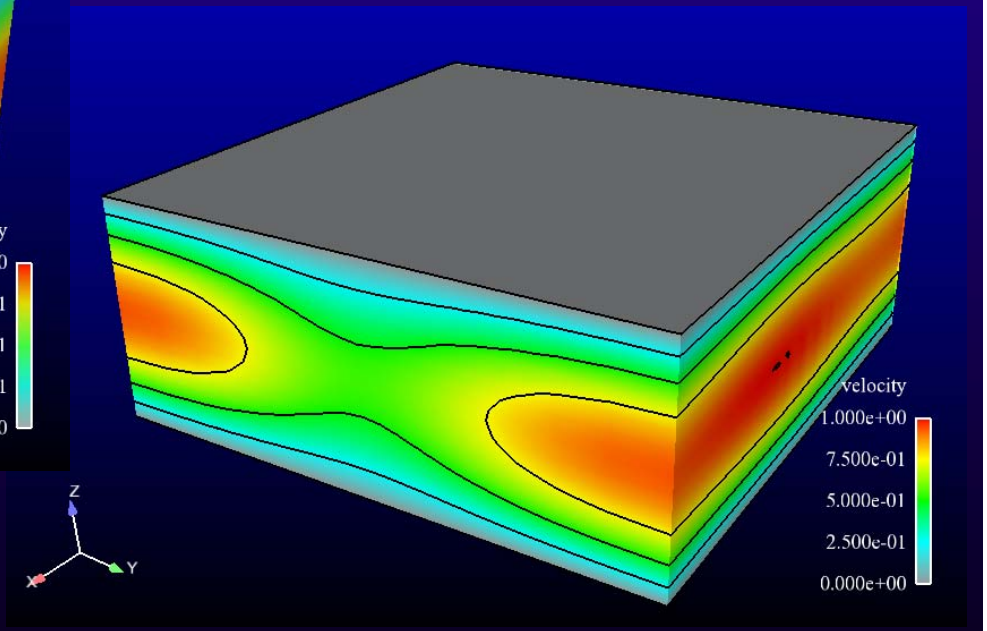


Contours can act as dividers

	Level	Color
1	1.0	
2	0.75	
3	0.5	
4	0.25	
5	0.0	

- Create a contour part colored black to emphasize level boundaries





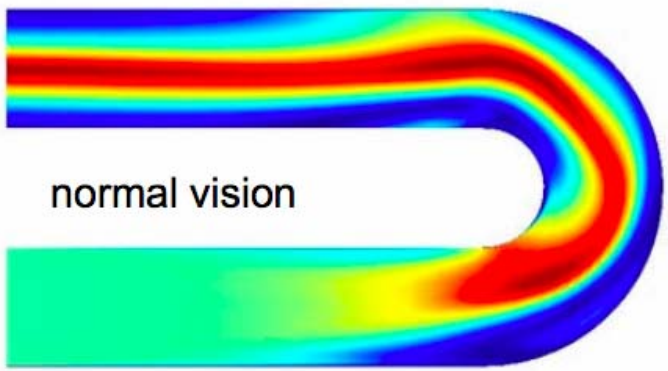
Color Deficiency

- Common in Asians and Caucasians
  - 8% caucasian males
  - 5% asian males
  - EnSightColorDef Pre-defined palette
- Most common forms
  - six types of dyschromatopsia have been identified
  - most are dichromatic, only two of three primary colors seen
  - typically, either red- or green-sensitive pigment is missing
  - actual “color-blind” are only 0.003% of caucasian males

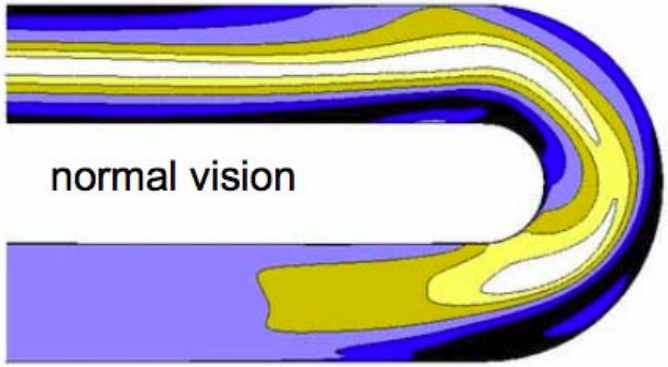
Color blindness

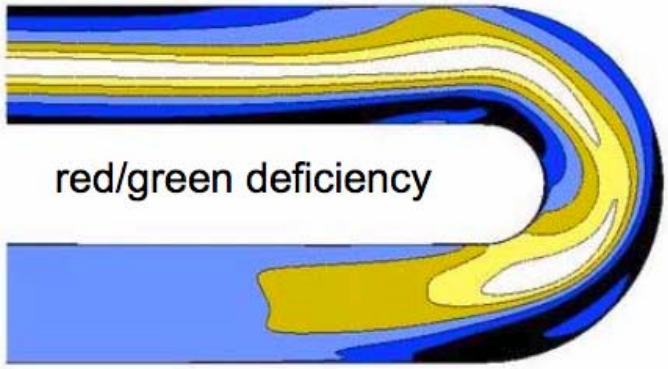
- To help the color deficient
  - Avoid red and green in palettes and in part coloring
  - Use banded colors and black to delineate colors
  - Use one color with brightness to indicate levels
  - Gray scales
  - EnSightColorDef Pre-defined palette
- Check your images
  - VISCHECK website:
  - input your image
  - Output is image with various color deficiencies

Color blindness



Above: typical rainbow color palette, below: special palette for color red/green deficiency

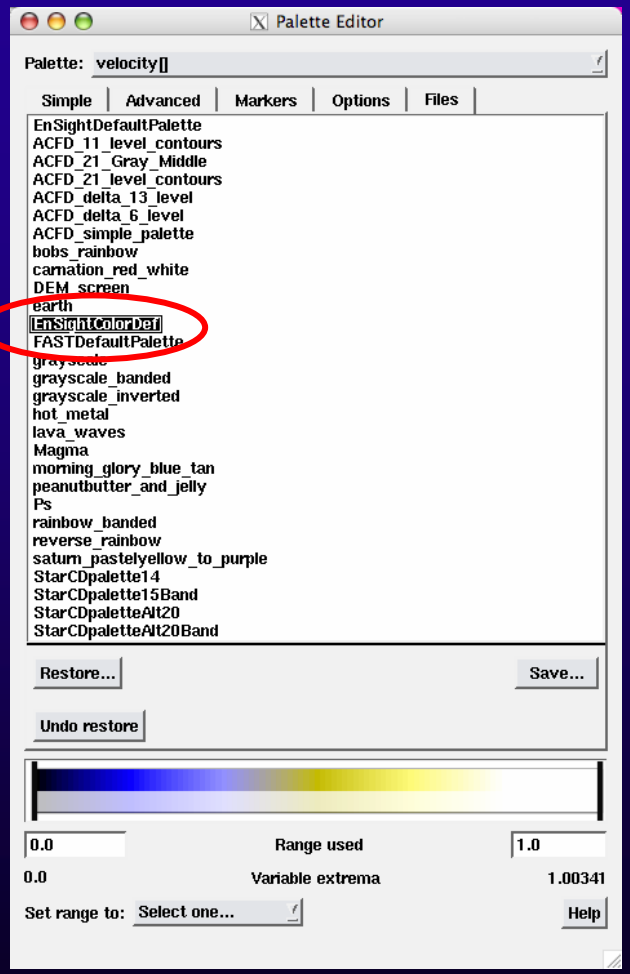




EnSight includes a Palette for Red/Green Color Deficiency

- Just Load (Restore) and go
- Click on Files Tab
- Choose EnSightColorDef

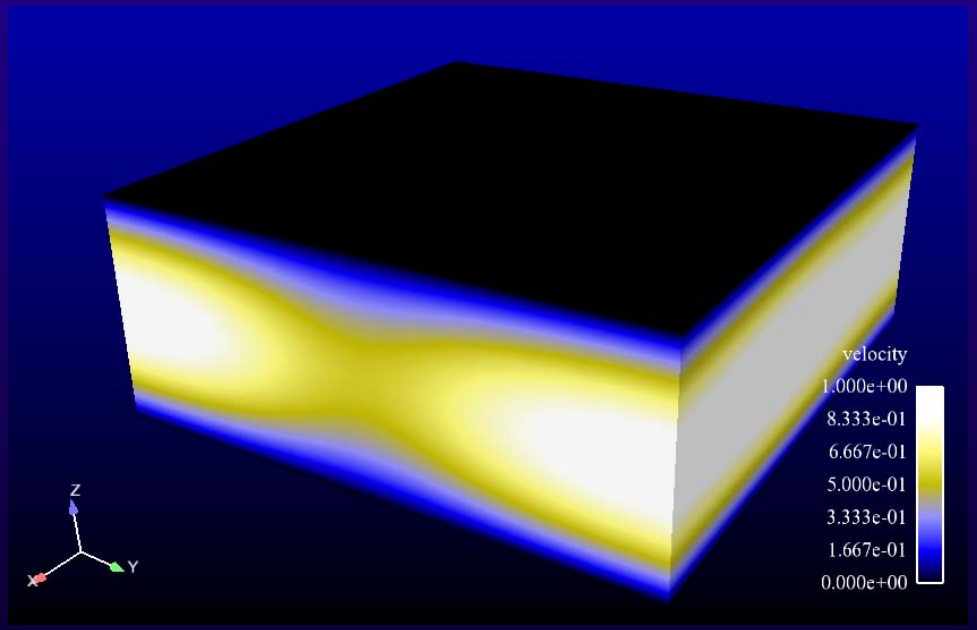
	Level	Color
1	1.0	
2	0.833333	
3	0.666667	
4	0.5	
5	0.333333	
6	0.166667	
7	0.0	



Color blindness

- EnSightColorDef - Special Palette for Color blindness

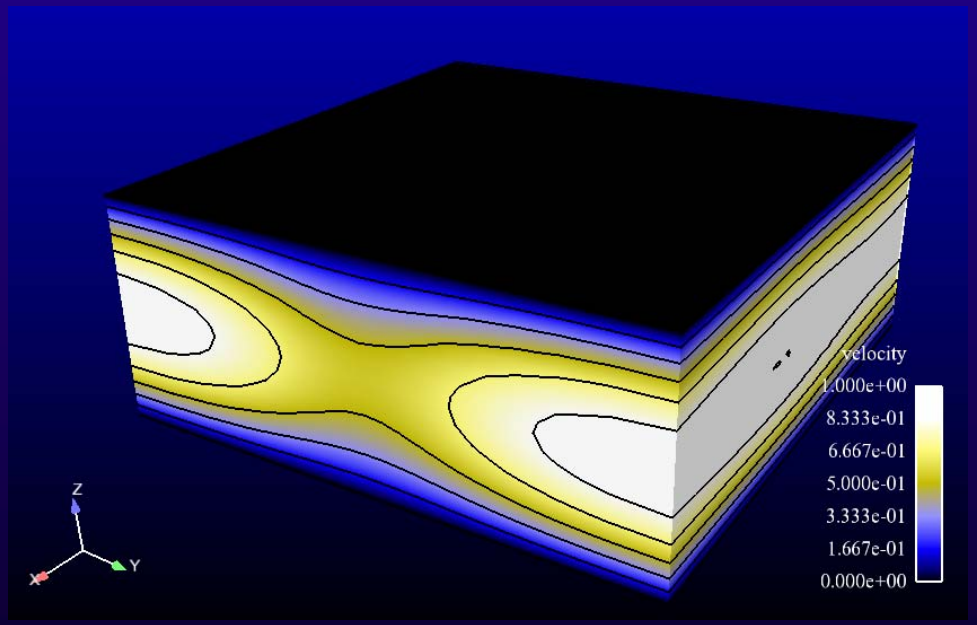
	Level	Color
1	1.0	
2	0.833333	
3	0.666667	
4	0.5	
5	0.333333	
6	0.166667	
7	0.0	



Color blindness

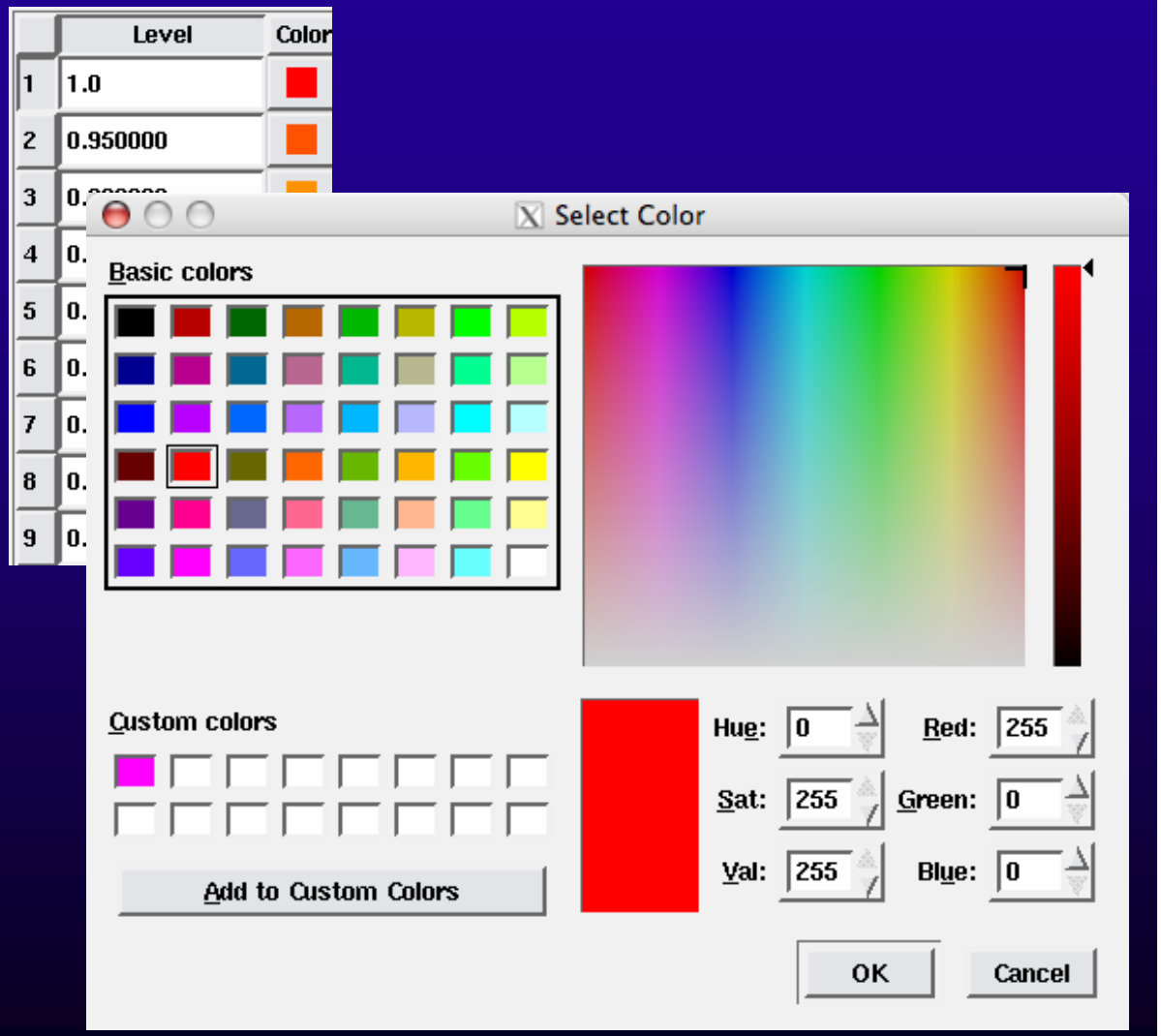
- EnSightColorDef - Special Palette for Color blindness
- Use contours to further set the colors apart

	Level	Color
1	1.0	
2	0.833333	
3	0.666667	
4	0.5	
5	0.333333	
6	0.166667	
7	0.0	

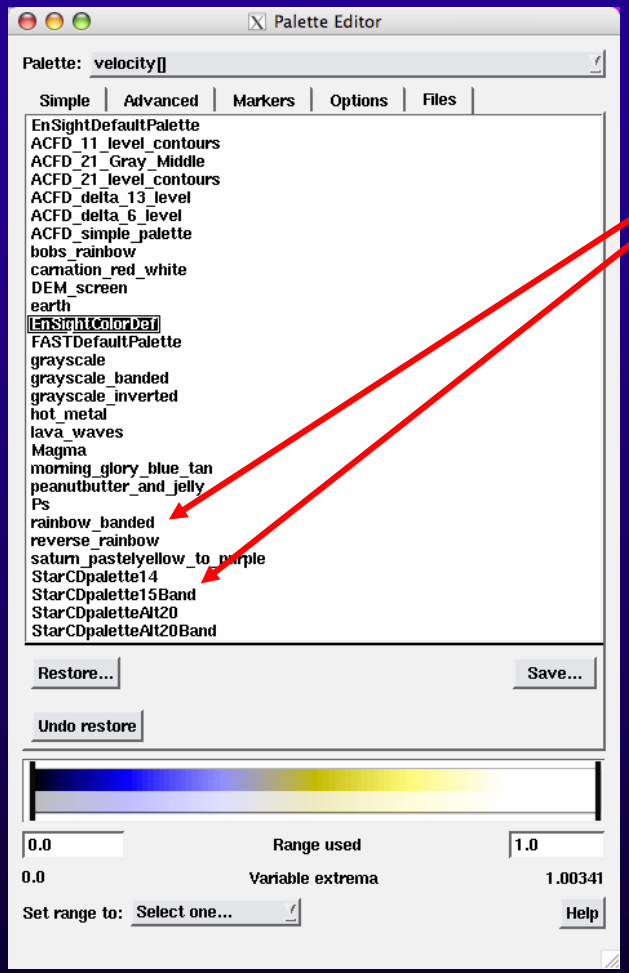


How to make my own Palette?

- Pick your number of levels
- Edit the colors by clicking on them
- Use the color selector to pick a color
- Save to disk

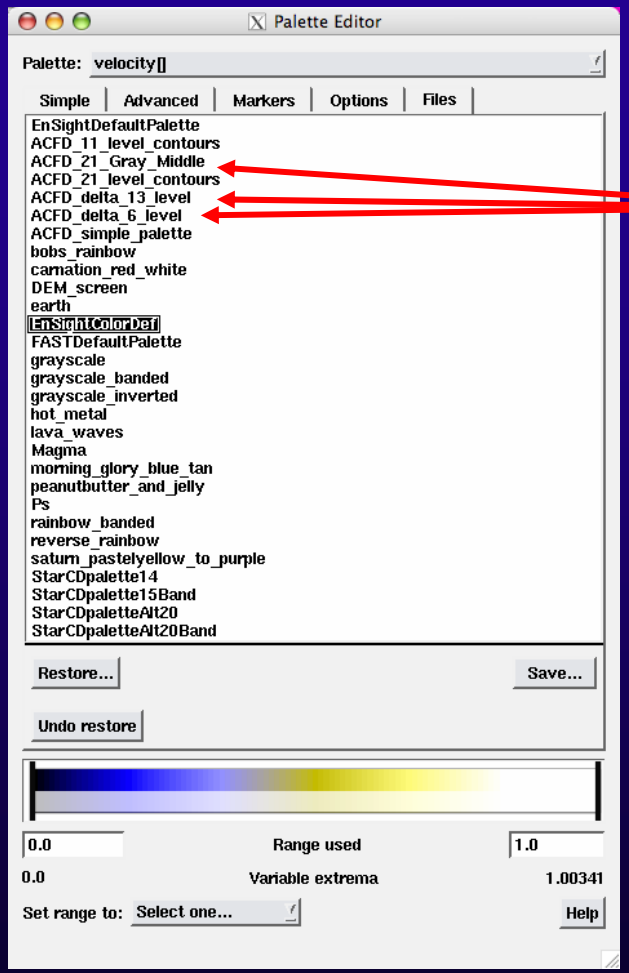


What other palettes are included?



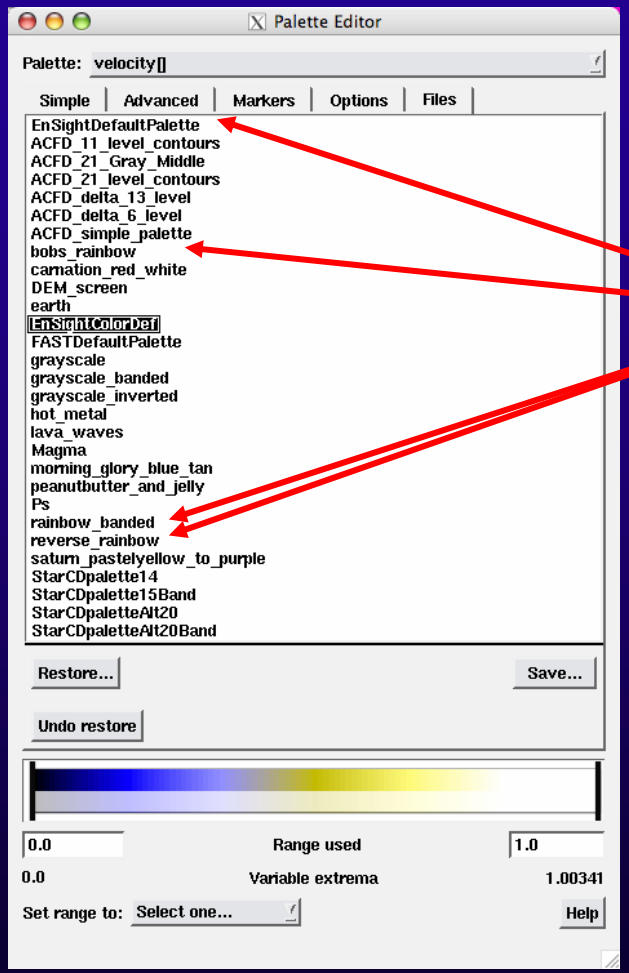
- Palettes that have banding

What other palettes are included?



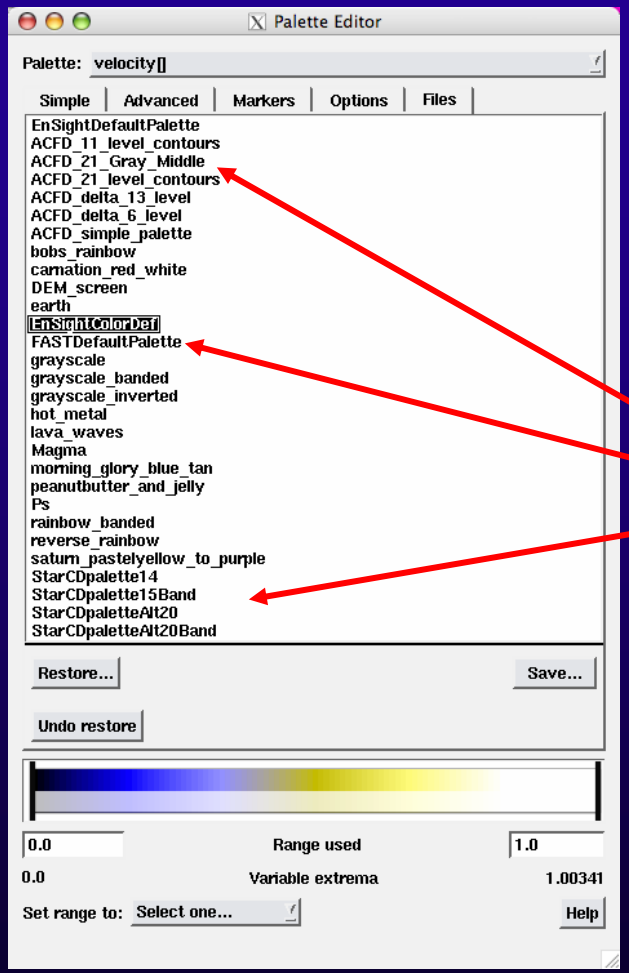
- Palettes that have banding
- Grayed out middle

What other palettes are included?



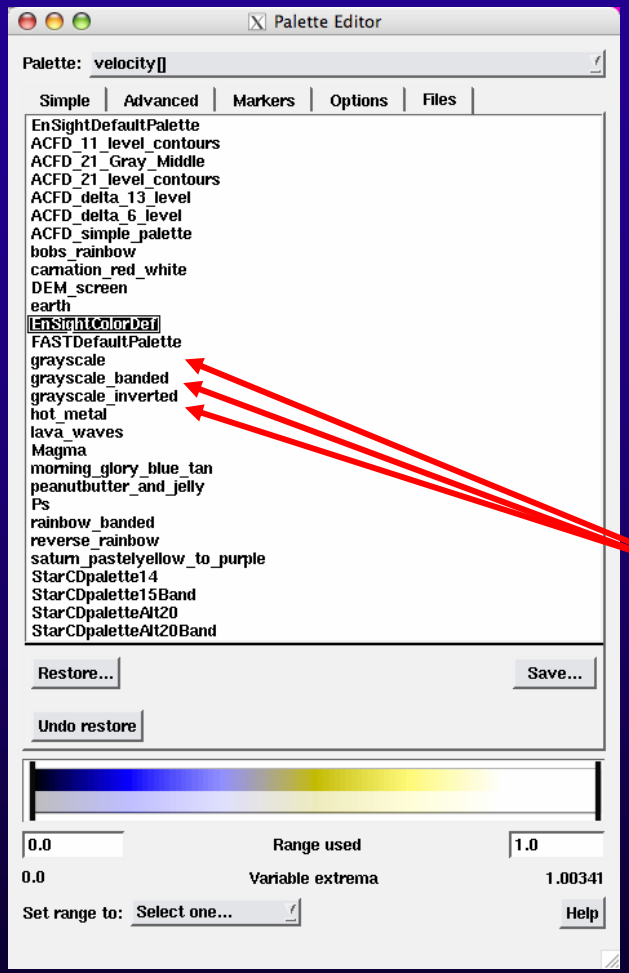
- Palettes that have banding
- Grayed out middle
- Rainbow and reverse rainbow

What other palettes are included?



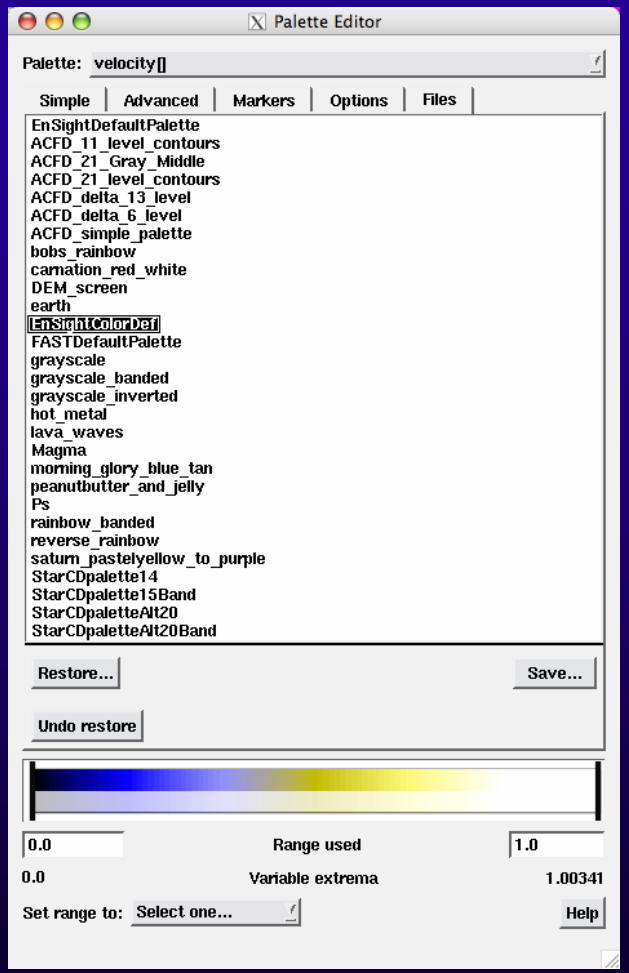
- Palettes that have banding
- Grayed out middle
- Rainbow and reverse rainbow
- Custom solver palettes

What other palettes are included?



- Palettes that have banding
- Grayed out middle
- Rainbow and reverse rainbow
- Custom solver palettes
- Grayscale

What other palettes are included?

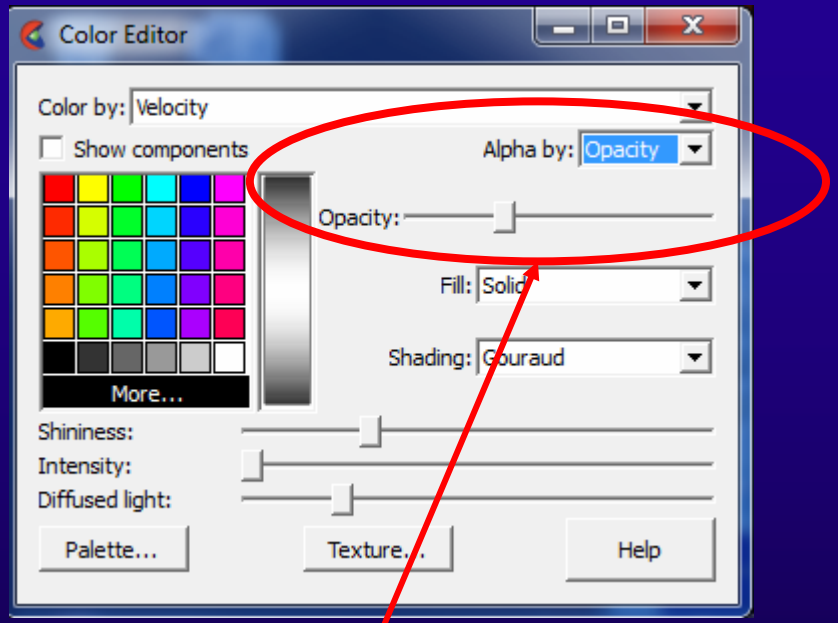


- Over two-dozen pre-defined palettes
- The most requested
- The best of the best
- Art class meets Engineering
- Consider your target audience
- Consider the possible media

New feature: palette alpha

Vary the transparency based on the values of a variable

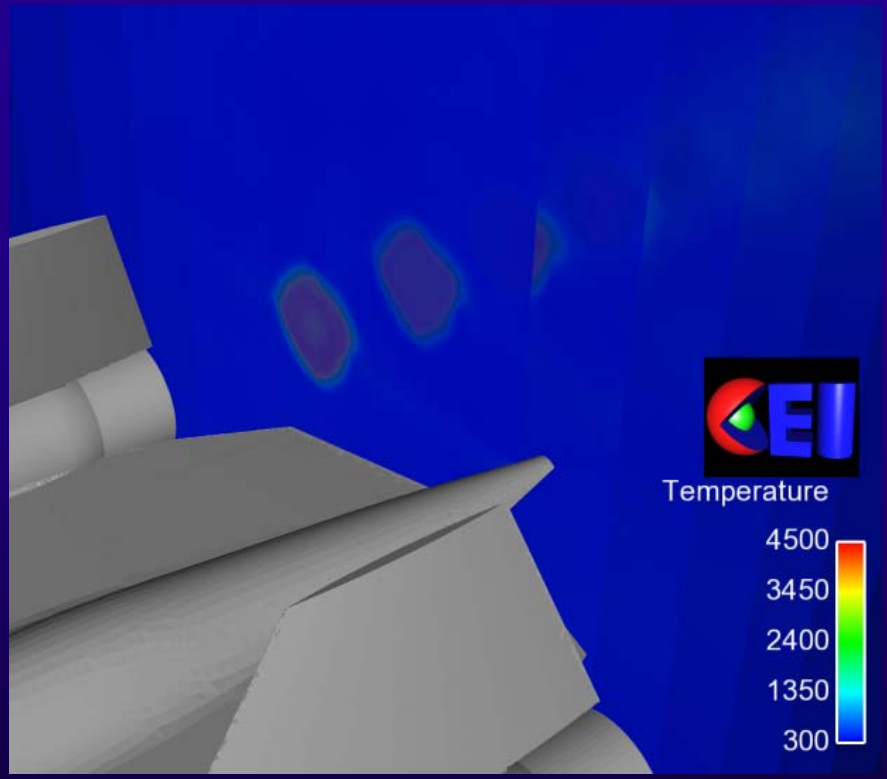
Constant transparency



Alpha by: Opacity

Using Opacity: slider

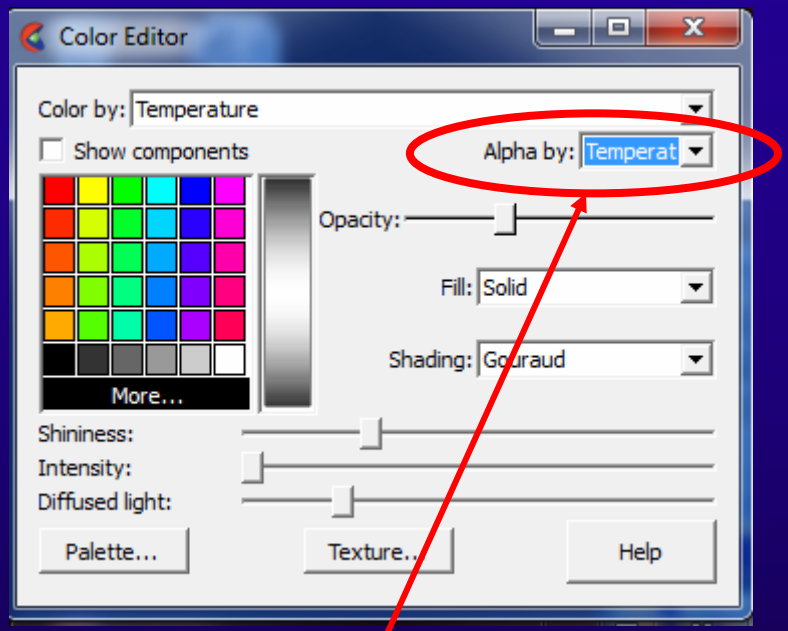
choose an opacity value from 0 to 1



Multiple clip planes

with constant partial transparency

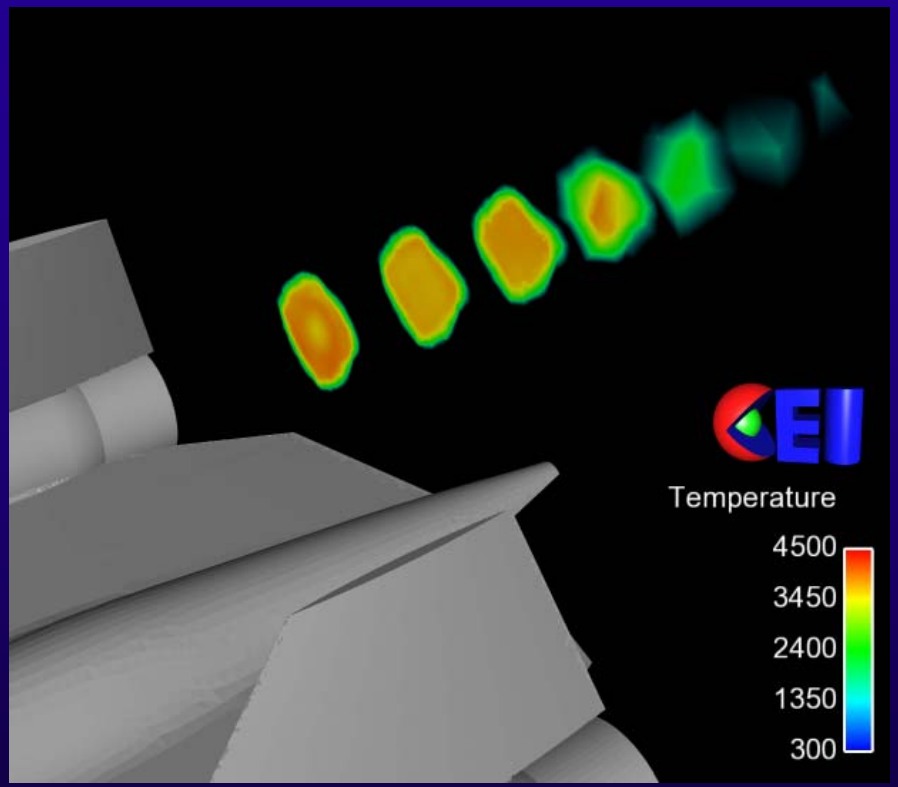
Palette transparency



Alpha by: Variable name

Then set the opacity in the palette editor

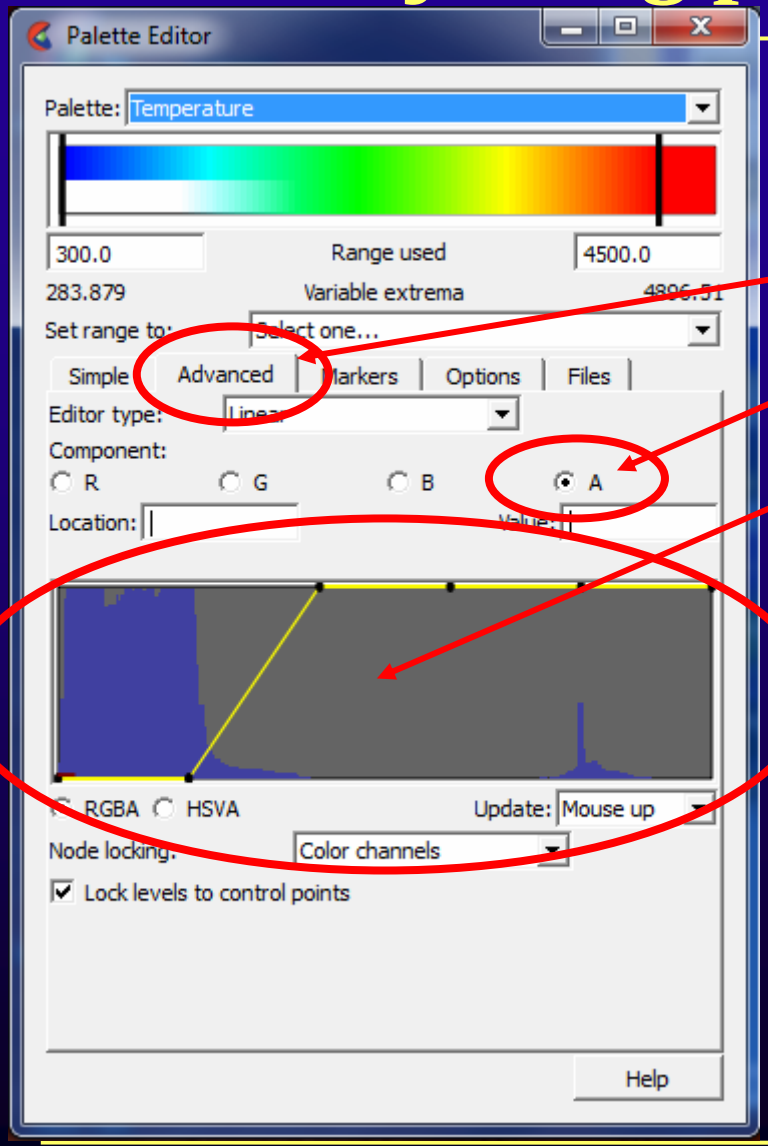
(Opacity: slider has no effect)



Multiple clip planes

with selective transparency

Adjusting palette transparency

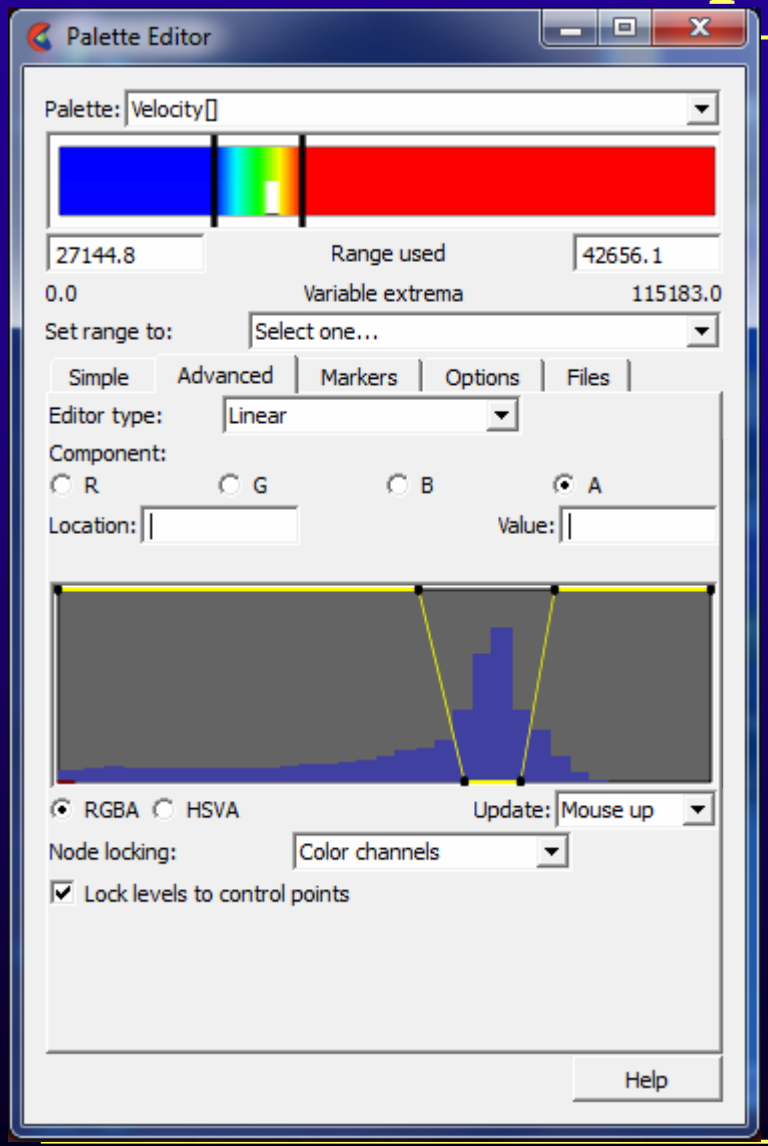


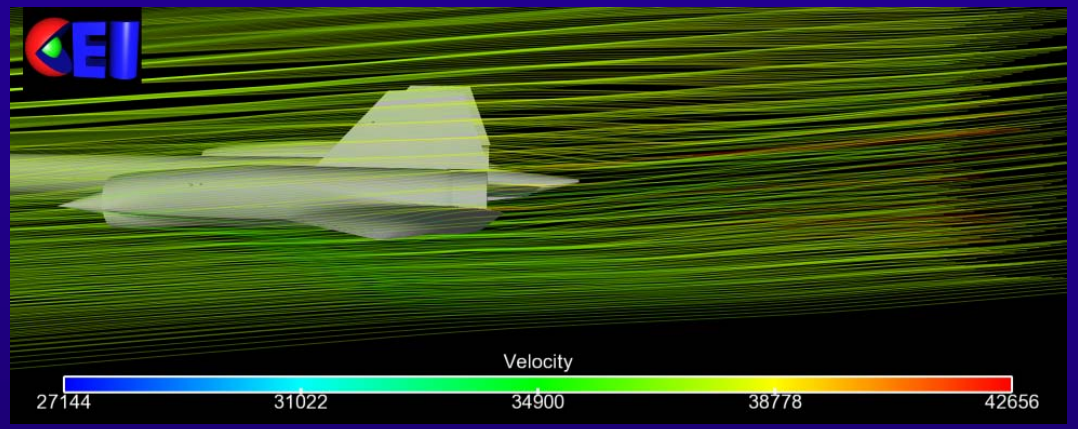
Palette editor window

- Advanced tab
- Component: A (alpha)
- See histogram of variable values and set alpha function

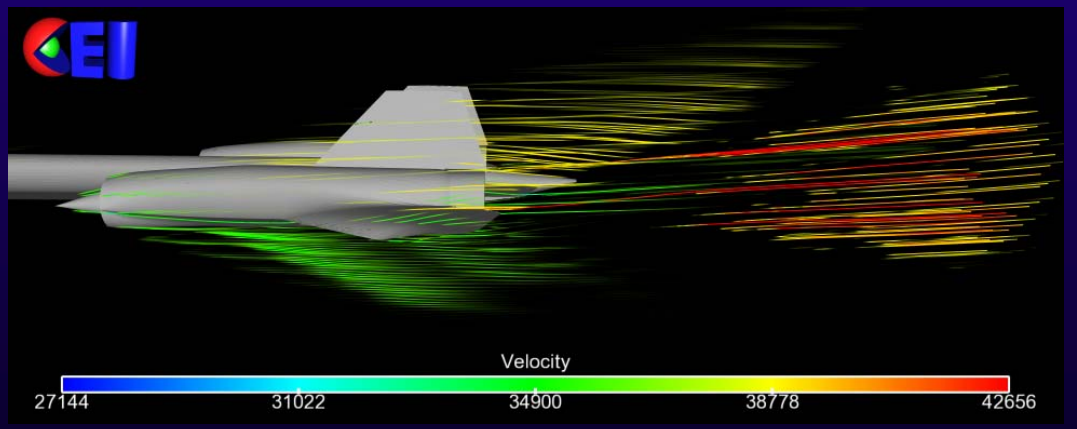
- Similar effects can also be achieved using:
  - Options tab, Limit fringes: By invisible, or
  - By creating isovolumes

Example: Streamlines





Too many streamlines (400) can't see clearly



Make uninteresting middle values transparent