

Color Table Ranges - Lookup Table (Gamma)

Normally the range of data values and the range of colors are linearly related or logarithmically related if the `ModifyImage log` parameter is set to 1. You can also cause the mapping to be nonlinear by specifying a lookup (or “gamma”) wave, as described in the next example.

Example: Using a Lookup for Advanced Color/Contrast Effects

The **ModifyImage** operation (see page V-635) with the lookup parameter specifies a 1D wave that modifies the mapping of scaled Z values into the current color table. Values in the lookup wave should range from 0.0 to 1.0. A linear ramp from 0 to 1 would have no effect while a ramp from 1 to 0 would reverse the color-map. Used to apply gamma correction to grayscale images or for special effects.

```
Make luWave=0.5*(1+sin(x/30))
Make /n=(50,50) simpleImage=x*y
NewImage simpleImage
ModifyImage simpleImage ctab= {*,*,Rainbow,0}

// After inspecting the simple image, apply the lookup:
ModifyImage simpleImage lookup=luWave
```

Specialized Color Tables

Some of the color tables are designed for specific uses and specific numeric ranges.

The **BlackBody** color table shows the color of a heated “black body”, though not the brightness of that body, over the temperature range of 1,000 to 10,000 K.

The **Spectrum** color table is designed to show the color corresponding to the wavelength of visible light as measured in nanometers over the range of 380 to 780 nm.

The **SpectrumBlack** color table does the same thing, but over the range of 355 to 830 nm. The fading to black is an attempt to indicate that the human eye loses the ability to perceive colors at the range extremities.

The **GreenMagenta16**, **EOSOrangeBlue11**, **EOSSpectral11**, **dBZ14**, and **dBZ21** tables are designed to represent discrete levels in weather-related images, such as radar reflectivity measures of precipitation and wind velocity and discrete levels for geophysics applications.

The **LandAndSea**, **Relief**, **PastelsMap**, and **SeaLandAndFire** color tables all have a sharp color transition which is intended to denote sea level. The **LandAndSea** and **Relief** tables have this transition at 50% of the range. You can put this transition at a value of 0 by setting the minimum value to the negative of the maximum value:

```
ModifyImage imageName, ctab={-1000,1000,LandAndSea,0} // image plot
ColorScale/C/N=scale0 ctab={-1000,1000,LandAndSea,0} // colorscale
```

The **PastelsMap** table has this transition at 2/3 of the range. You can put this transition at a value of 0 by setting the minimum value to twice the negative of the maximum value:

```
ModifyImage imageName, ctab={-2000,1000,PastelsMap,0} // image plot
ColorScale/C/N=scale0 ctab={-2000,1000,PastelsMap,0} // colorscale
```

This principle can be extended to the other color tables to position a specific color to a desired value. Some trial-and-error is to be expected.

The **BlackBody**, **Spectrum**, and **SpectrumBlack** color tables are based on algorithms from the Color Science web site:

<<http://www.physics.sfasu.edu/astro/color.html>>.

Color Table Details

The built-in color tables can be grouped into several categories.