

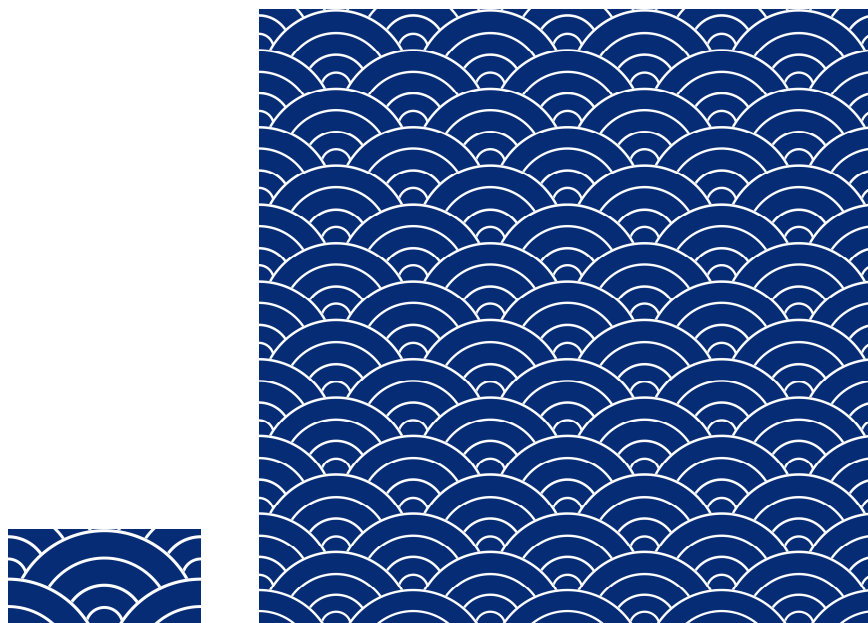
# Wave Transformation Notes

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## Introduction

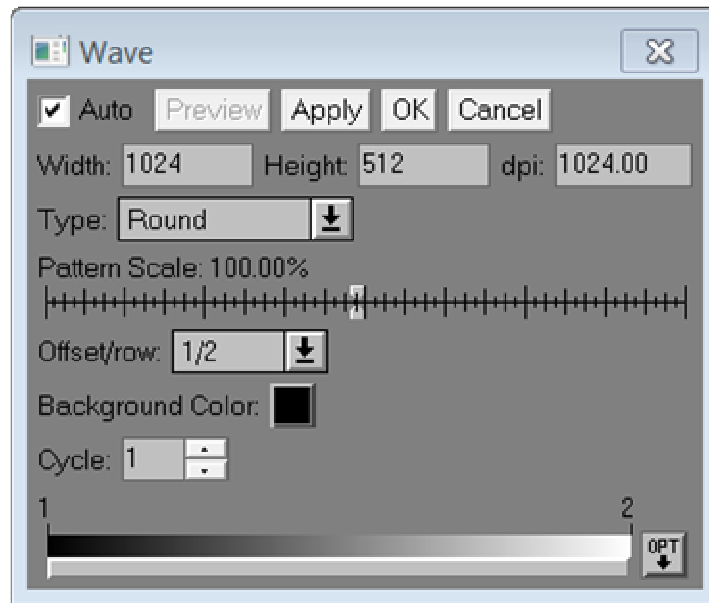
The Wave transformation creates images that can be seamlessly tiled. These images are constructed by painting a pattern in overlapping rows with every other row offset by half the pattern width. The repeating pattern can in turn be either a radial gradient in one of several shapes or it can be defined by a custom image and mask.

The original motivation for this transformation was to create a simulation of "seigaiha" or wave patterns originally used as a fill pattern to indicate ocean on Japanese maps and later adopted as a common pattern for papers or embroidery. Illustrated below is a single seamless tile in the classical Japanese pattern as produced by the Wave transformation and the same tile repeated multiple times using the Tile transformation.



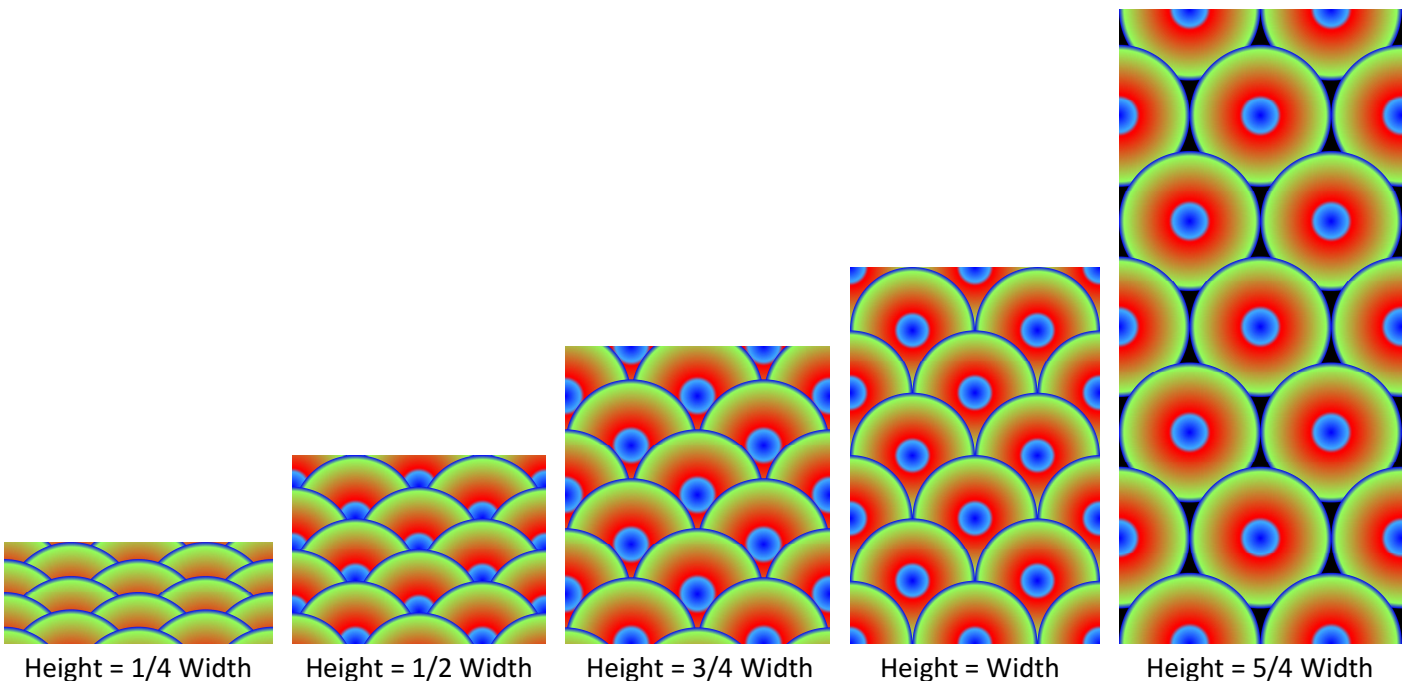
Seamless tiles can be used as web page backgrounds, as backgrounds in the Layout or Mat transformations or -- by extending them with the Tile transformation -- to print custom gift wrap or origami paper.

## User Interface



### Width/Height/dpi

These settings determine the dimensions of the output image in pixels and the resolution in dots/inch. The width setting just controls the width of the result image. The height setting determines both the height of the result image and the amount of overlap between successive rows of patterns -- the larger the setting, the more space between rows.



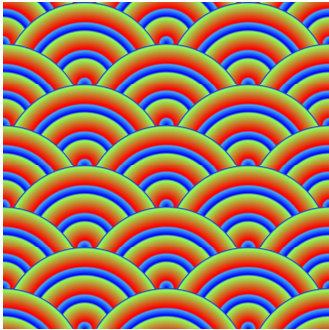
Changing the dpi setting does not affect the output image other than to determine its physical size in inches. This can be useful when using the Mat transformation which uses this physical size to determine how large to make the pattern.

## Type

The Wave transformations supports several different pattern types:

### Round/Diamond/Square/Octagon

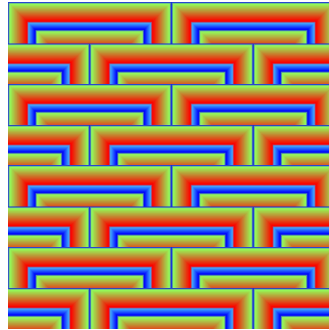
These pattern types all use the same gradient to define the pattern, but differ in the shape of the pattern produced. The easiest way to understand this is to see a few examples:



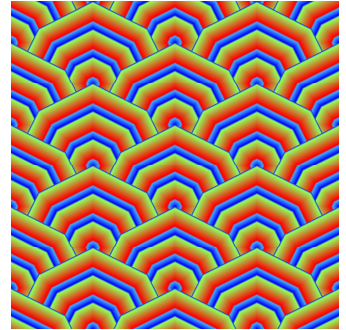
Round



Diamond



Square



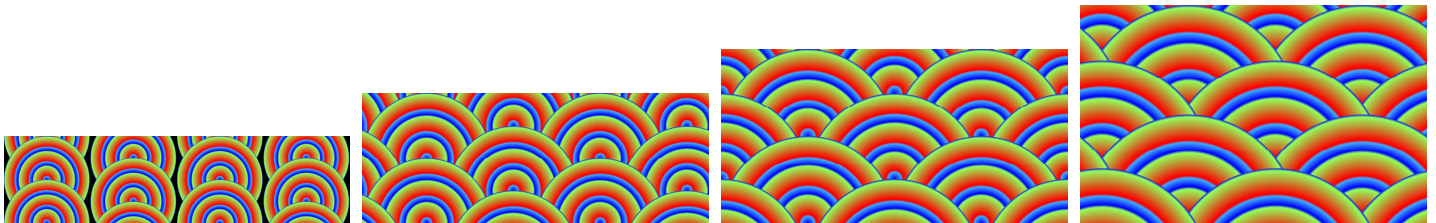
Octagon

### Custom

The custom type is described later.

### Pattern Scale

Adjusting the pattern scale slider makes the individual patterns smaller or larger. The same scale factor is applied to the height of the result image -- if this was not done the result image would not repeat seamlessly when vertically tiled.



Scale = 25%

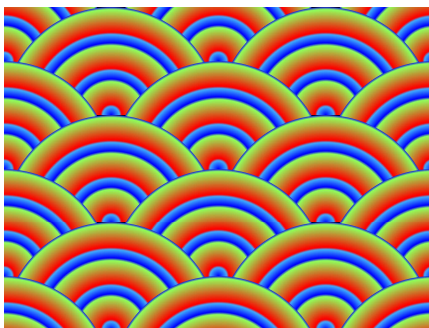
Scale = 50%

Scale = 100%

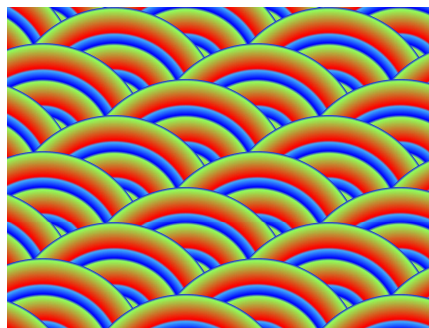
Scale = 125%

### Offset/row

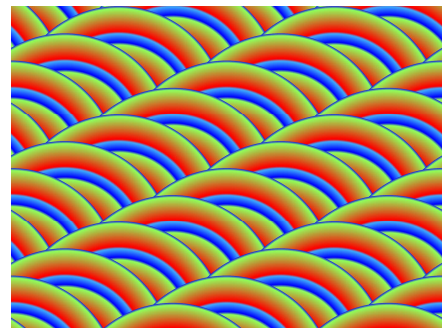
This setting determines by what fraction of the full pattern width each successive row is shifted to the right or left.



Offset/row = 1/2



Offset/row = 1/3 right



Offset/row = 1/4 right

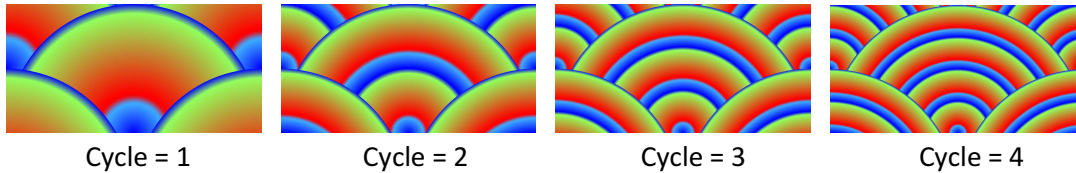
## **Background Color**

The background color setting determines the color of the background that the result image is filled with before painting rows of patterns over it. In most the examples shown so far, the background is totally obscured so its color doesn't matter, but as you increase the height setting or reduce the pattern scale, space can open up between rows and the background color fills this space.

## Cycle and Color Line

The cycle and color line controls at the bottom of the dialog box determine the nature of the gradient used to fill the pattern. While these are the same controls used in the Gradient transformation, some examples may be useful to illustrate the available range of effects.

The cycle setting simply causes the gradient defined by the color line to be repeated multiple times.



The color line defines the colors in the gradient with the left edge corresponding to the center of the pattern and the right edge corresponding to its outer edge. For example, here is the color line that produced the patterns above:



The color line starts out with two control points labeled 1 and 2 at either end -- these two control points are fixed at the ends and cannot be moved.



To lengthen the color line to make detailed editing easier, resize the dialog box to make it wider. The color line automatically expands to match the width of the dialog box.

To create additional control points, shift-click on the color line near where you want a new control point to appear.

To remove a control point, ctrl-click on the color line near its number label.

To reposition a control point drag it by its number label. You cannot drag one control point past another.

To change the color of a control point, double-click near its number label. This brings up a color picker you can use to set the color. A useful feature of the color picker is that you can use its eyedropper to select colors from an image.

To change the transition between control points, click the lower part of the color line between two control points. This brings up a menu with various options.

### Step Left/Step Right/Step Center

These options produce an abrupt transition that occurs at the left control point, the right control point or at the midpoint between the two.

### Line/Sine

These options produce a gradual transition from the left control point to the right control point by linear or sinusoidal interpolation between them. The sine option often produces a smoother-looking transition.

## **RGB/HSVCW/HSVCCW/HSLCW/HSLCCW**

These settings determine the color space used to interpolate between control points. RGB is the default and produces the simplest transition. The other options interpolate in HSV or HSL color space with the hue varying either clockwise (CW) or counter-clockwise (CCW) around the color wheel. These latter transitions can be used to produce rainbow-like results.

Clicking the **Opt** button at the right end of the color line brings up an options menu:

### **Reset**

This resets the color line back to its initial state.

### **Equal Spacing**

This moves the control points so they are equally spaced along the entire color line. This is useful if you want to produce a pattern consisting of equal width bands of color.

### **Load...**

This command lets you load a saved color line file.

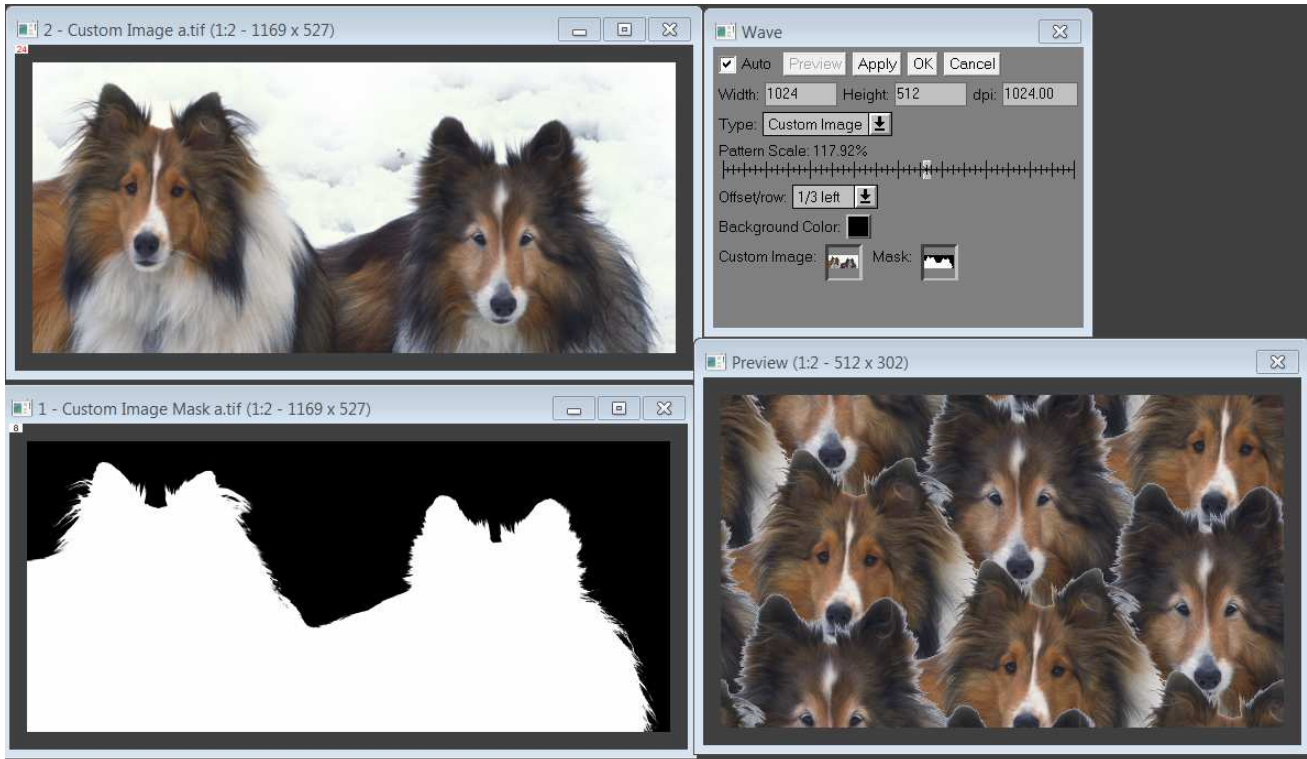
### **Save As...**

This command lets you save the current color line as a file for later re-use.

## Custom Image Style

When you set the Style setting to Custom Image, the cycle and color Line controls are replaced by image selectors for a custom image and a mask for that image.

When you select a custom image, it is resized so its width in pixels equals the width specified in the Width control. This resized image is then painted in rows instead of a gradient pattern. If specified, the mask image is used to define what parts of the custom image are painted. The mask should be white for the object to be repeated and black for the background. Here is an example:



And this is what this pattern looks like tiled:

