References

The ImageRegistration operation is based on an algorithm described by:

Thévenaz, P., and M. Unser, A Pyramid Approach to Subpixel Registration Based on Intensity, *IEEE Transactions on Image Processing*, 7, 27-41, 1998.

ImageRemoveBackground

`ImageRemoveBackground /R=`*roiWave* [*flags*] *srcWave*

The ImageRemoveBackground operation removes a general background level, described by a polynomial of a specified order, from the image in *srcWave*. The result of the operation are stored in the wave M_RemovedBackground.

Flags

/F	Computes only the background surface fit. Will only store the resulting fit in M_RemovedBackground. This will not subtract the fit from the image.
/O	Overwrites the original wave.
/P=*polynomial order*	Specifies the order of the polynomial fit to the background surface. If omitted, the order is assumed to be 1.
/R=*roiWave*	Specifies a region of interest (ROI). The ROI is defined by a wave of type unsigned byte (/B/U), which has the same number of rows and columns as the image wave.
	Set the pixels that define the background region to 1. The remaining pixels can be any value other than 1. We recommend using 64 which Igor image processing operations often interpret as "blank" in unsigned byte image waves.
	The ROI does not have to be contiguous.
	See **ImageGenerateROIMask** for more information on creating ROI waves.
/W	Specifies that polynomial coefficients are to be saved in the wave W_BackgroundCoeff.

Details

The identification of the background is done via the ROI wave. Set the pixels that define the background region to 1. The remaining pixels can be any value other than 1. We recommend using 64 which Igor image processing operations often interpret as "blank" in unsigned byte image waves.

The operation first performs a polynomial fit to the points designated by the ROI wave using the specified polynomial order. A polynomial of order N corresponds to the function:

$$F_N(x,y) = \sum_{m=0}^{N} \sum_{n=0}^{m} c_{nm} x^{m-n} y^n.$$

Using the polynomial fit, a surface corresponding to the polynomial is subtracted from the source wave and the result is saved in M_RemovedBackground, unless the /O flag is used, in which case the original wave is overwritten.

Use the /W flag if you want polynomial coefficients to be saved in the W_BackgroundCoeff wave. Coefficients are stored in the same order as the terms in the sums above.

If you do not specify the polynomial order using the /P flag, the default order is 1, which means that the operation subtracts a plane (fitted to the ROI data) from the source image.

Note, if the image is stored as a wave of unsigned byte, short, or long, you might consider converting it into single precision (using `Redimension/S`) before removing the background. To see why this is important, consider an image containing a region of pixels equal to zero and subtracting a background plane corresponding to a nonconstant value. After subtraction, at least some of the pixels in the zero region should become negative, but because they are stored as unsigned quantities, they appear incorrectly as large values.

Examples

See **Background Removal** on page III-379.