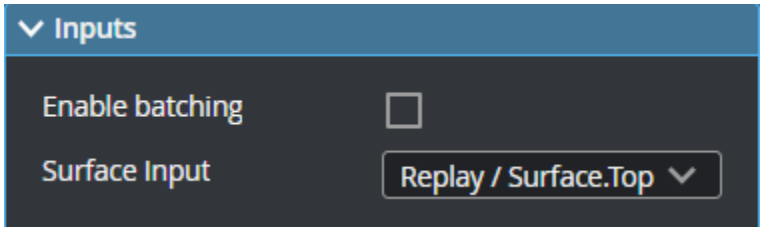
LMI TECHNOLOGIES

Surface Spike Noise Removal

Purpose

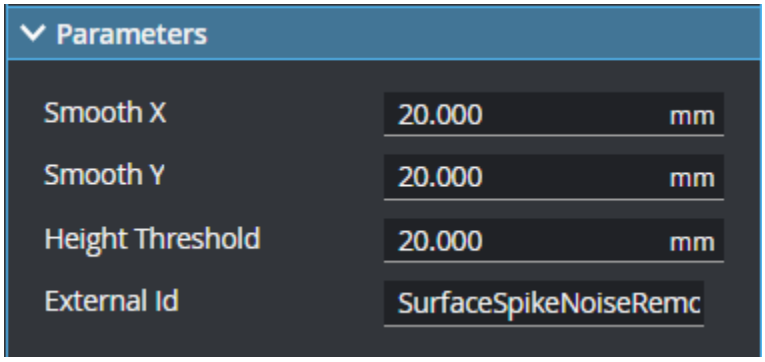
The tool is used to remove spike noise (appears scattering sparsely in 3d space) in the scanned surface. It firstly smooths the input with a very large kernel so that every high frequency feature disappears. Then, the difference between the original and smoothed surface is calculated to obtain the high frequency feature. A threshold is finally used to remove the most salient high frequency feature.

Inputs



Name	Description
Surface Input	The uniform surface data that the tool will filter.

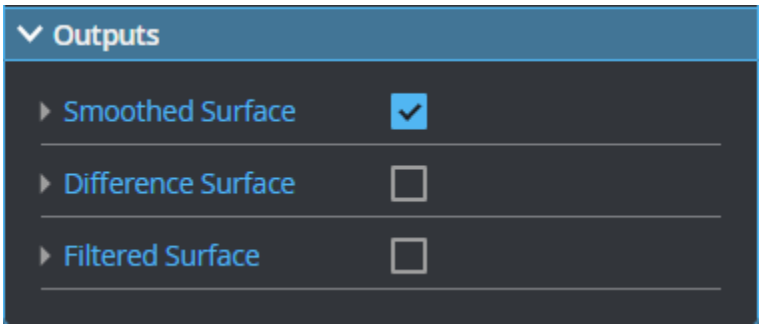
Parameters



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Name	Description
Smooth X	Smooth kernel size X.
Smooth Y	Smooth kernel size Y.
Height Threshold	Height threshold applied on the difference surface.

Outputs



Type	Name	Description
Data	Smoothed Surface	The smoothed surface by averaging points in a small region defined by the kernel.
Data	Difference Surface	The difference between the input surface and the smoothed surface.
Data	Filtered Surface	The result surface after removing noise, which is indicated by values above ‘Height Threshold’ in difference surface.

Major Revisions

Application Examples

Here is an example showing scans with strong noise, smoothed/difference/filtered surface.

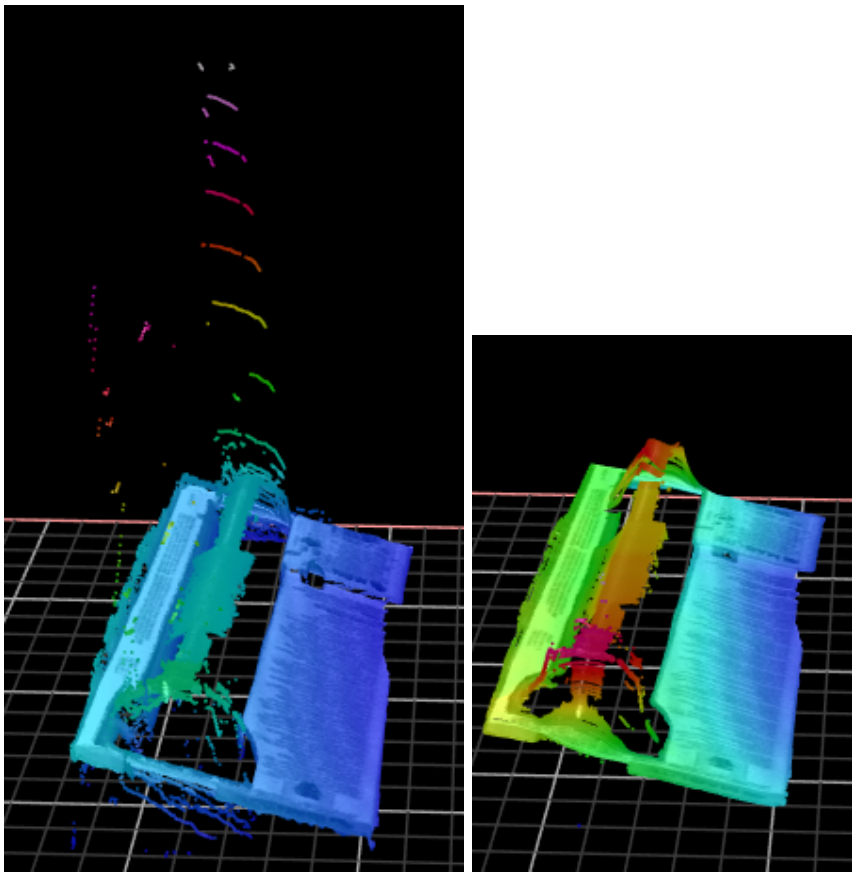


Fig. (left) original surface with noise. (right) smoothed surface, note that data on the real object is also significantly smoothed.

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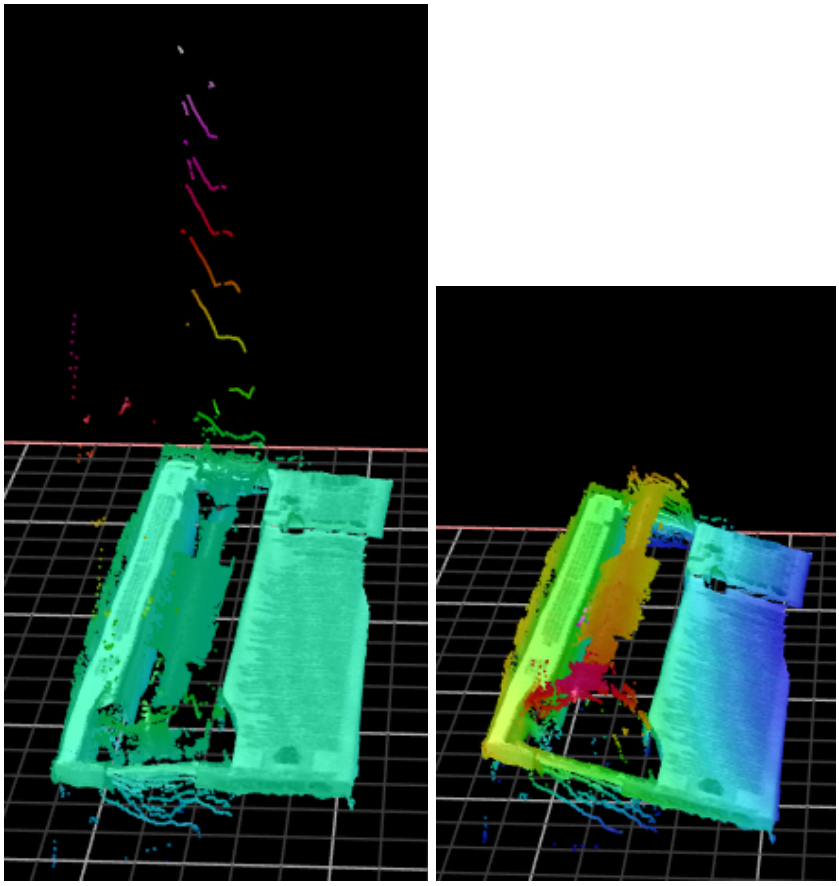


Fig. (left) Difference surface. High frequency info / noise will appear high and the real object data is around zero. (right) filtered surface with noise removed but keeping object data untouched.

Limitation:

If there are high frequency features on the real object, these high frequency features will get removed to some extent. However, in typical applications, this will not be the case, see below.

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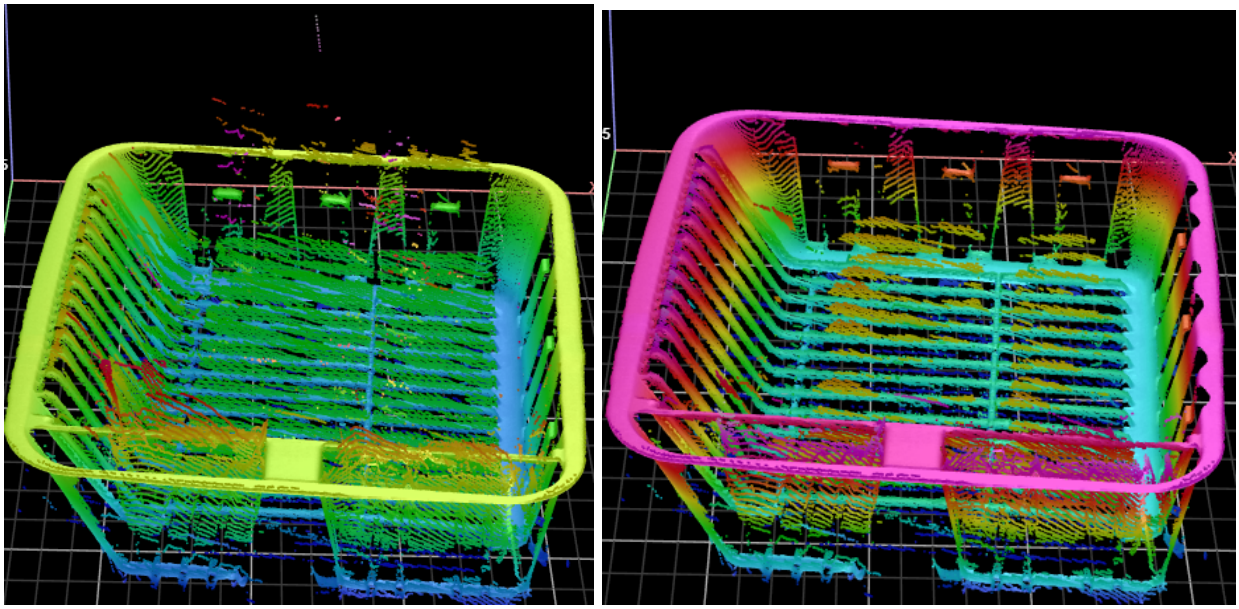


Fig. (left) Original surfaces with high frequency feature (right) Noise removed as well as high frequency feature by the filter.

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