Oscillating Baseline Correction for LFA Signals

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Baseline correction is an established tool for data pre-processing of LFA (laser flash analysis) signals. It is employed to eliminate disturbance or noise components that are not related to the actual heat transfer of the material. The baseline describes the signal curve before the energy input by the laser or flash lamp. Based on various mathematical descriptions, different forms of baseline corrections are possible. So far, the following baseline types have been offered in the *Proteus*® LFA analysis software:

- linear
- shifted
- horizontal

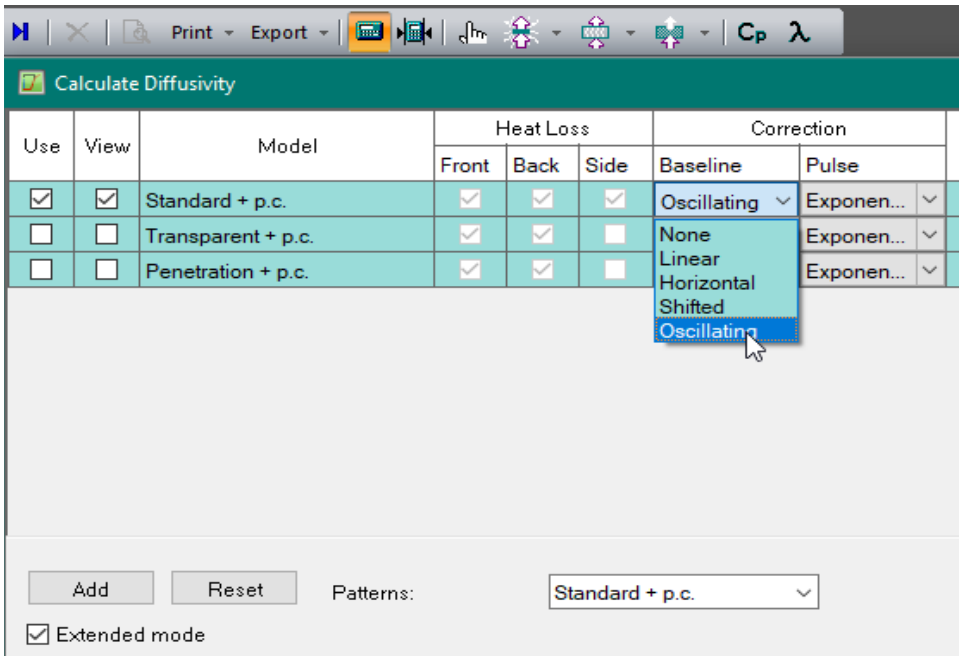
With the existing types, until now it had only been possible to carry out linear corrections or shifts of the signal based on the baseline. The release of *Proteus*® 9.6 now includes the additional baseline type "Oscillating", which allows the correction of oscillating baselines.

By analyzing the signal using Fourier analysis, the significant frequencies f_i of the baseline are automatically determined, allowing the signal to be corrected using the following mathematical description of the baseline:

$$y_{o,BL} = \sum_{i=1}^{N} A_i \cdot \sin(2\pi \cdot f_i \cdot t - \varphi_i)$$

In addition to the oscillating component described here, the linear component of the baseline (analogous to the Linear baseline type) is also taken into account when the baseline type "Oscillating" is selected. The determined baseline (consisting of the oscillating and linear components) is subtracted from the measured signal the same way as with the previously known correction types.

To use the oscillating baseline correction, open the calculation dialog as shown in figure 1. The "Oscillating" option is now also available in the baseline drop-down menu. Selecting an option activates the corresponding type of baseline correction.



1 Selection of the additional oscillating baseline correction option.

NGB · Softwre Innovation 025 · EN · 0325 · Technical specifications are subject to change.

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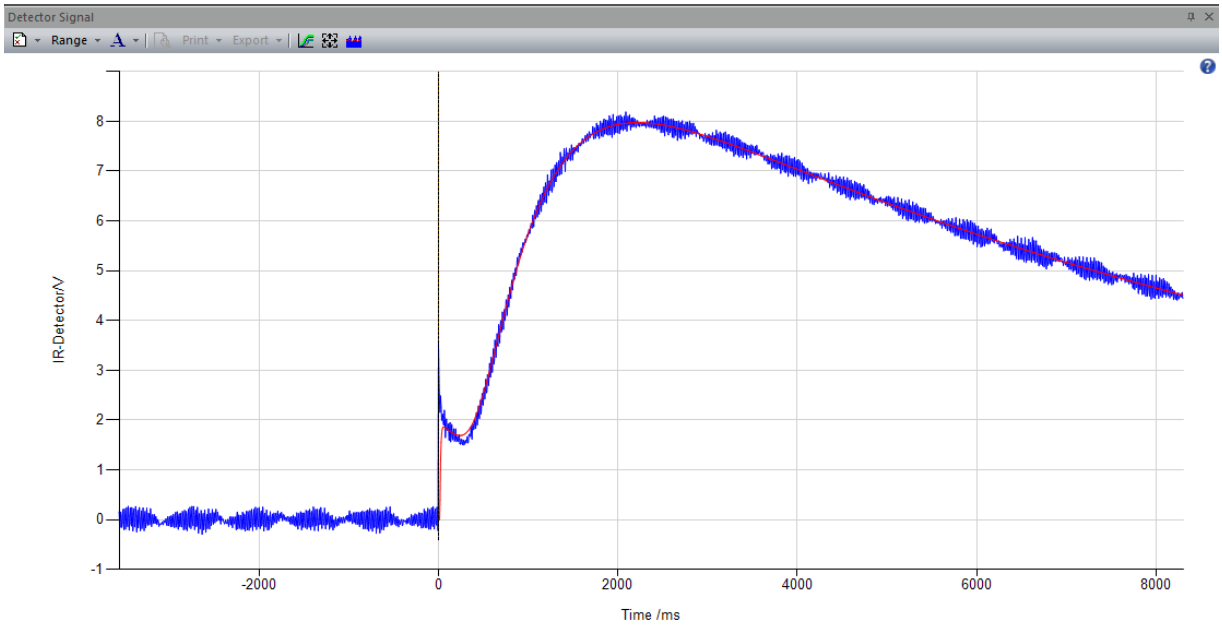
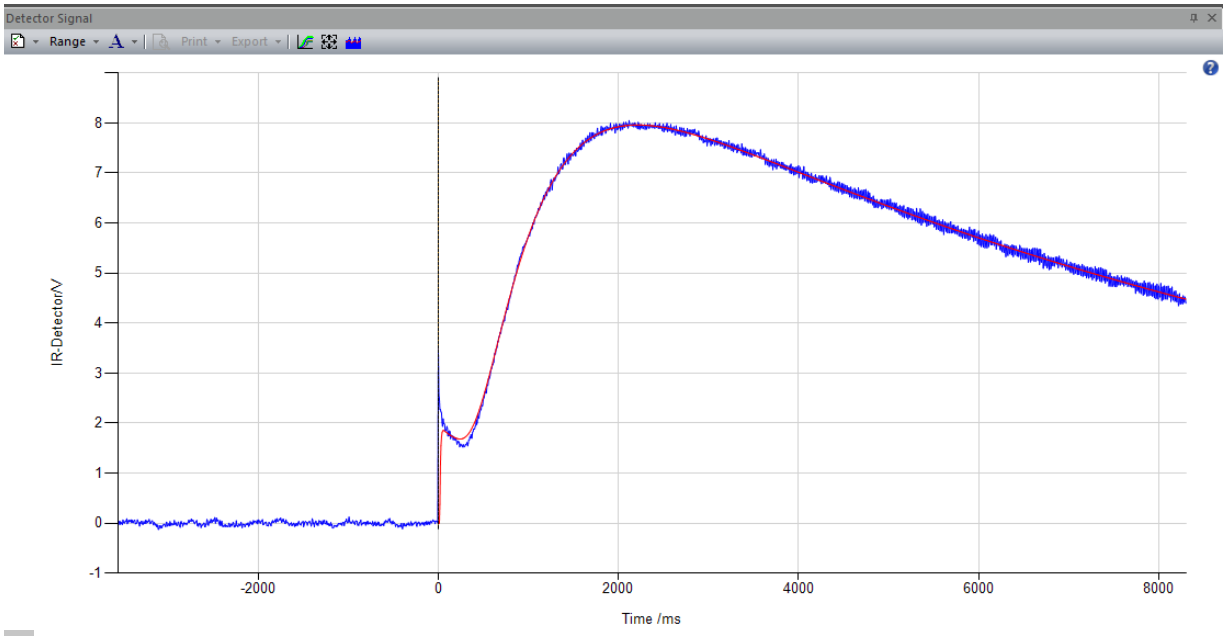
Figure 2 shows a detector signal to which a linear baseline correction has been applied. As expected, the oscillating part on the signal cannot be eliminated by the linear baseline correction. By comparison, figure 3 shows the same detector signal with the oscillating baseline correction applied.



2 Detector signal using the linearbaseline correction.



3 Detector signal using the oscillating baseline correction.

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