

Application of WMS Measurement Algorithm

The instrument has a set of WMS measurement system based on wavelet analysis, which can correctly calculate the absorption peak intensity through the second harmonic line under the condition of high noise and complex interference.

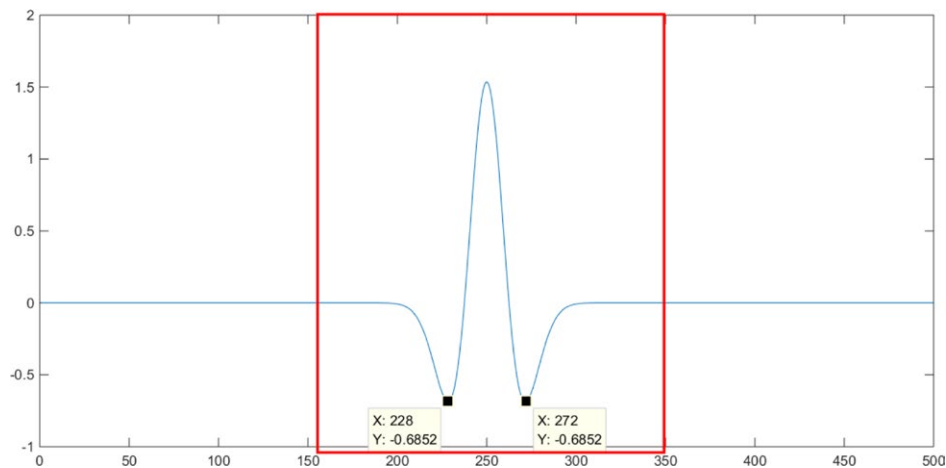
As the calculation adopts strict matching recognition algorithm, it is necessary to adjust the operating parameters of the instrument so that the sum of the second harmonic waveform meets the following characteristics:

1. The total number of strongholds is 300 to 600, adjusted by the triangular wave start span, and the scan slope parameter Ramp.
2. Under no-interference conditions (e. g., the absorption cell), the measured absorption peak is in the Atlas abscissa-centered region, i. e., the median scanning current value corresponds exactly to the absorption line of the gas
Adjusting the working temperature of the laser is the most effective method. Please note that even if the center working temperature of each semiconductor laser in a batch is different due to process error, it needs to be adjusted separately.
3. The 2f absorption peak is a forward waveform by regulating the phase (2f phase) until the positive reaches the maximum amplitude.
4. The absorption peak width matches the following description by adjusting the span of scanning start-stop current. The Amplitude of modulation also has some influence.

The target absorption spectrum line is shown below, which is an ideal straw hat type. You can refer to the gray curve of Graph page in TDLAS software. Or refer to the following arrays:

WAVELET=

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[-4,-5,-7,-9,-13,-18,-24,-32,-43,-57,-76,-100,-130,-169,-217,-277,-351,-442,-551,-682,-838,-1021,-1233,-1477,-1755,-2067,-2413,-2792,-3200,-3634,-4085,-4546,-5005,-5449,-5862,-6229,-6529,-6743,-6852,-6836,-6678,-6360,-5872,-5204,-4353,-3323,-2121,-763,728,2323,3990,5687,7373,9002,10530,11911,13104,14074,14789,15227,15375,15375,15227,14789, 14074,13104,11911,10530,9002,7373,5687,3990,2323,728,-763,-2121,-3323,-4353,-5204,-5872,-6360,-6678,-6836,-6852,-6743,-6529,-6229,-5862,-5449,-5005,-4546,-4085,-3634,-3200,-2792,-2413,-2067,-1755,-1477,-1233,-1021,-838,-682,-551,-442,-351,-277,-217,-169,-130,-100,-76,-57,-43,-32,-24,-18,-13,-9,-7,-5,-4]
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After the ideal waveform is obtained, the system will save the parameters and stop all automatic operation states. You can click WMS Start at the bottom of Graph page in TDLAS software to start a single measurement. The instrument will automatically repeat N scans, average and calculate the absorption peak intensity. The n is determined by the decimation parameter. In order to obtain high-precision and stable results, you can try to increase the average number of times; To respond quickly, you can reduce the average number of times to 1.

Unsigned data with absorption peak intensity ranging from 0 to 50,000, in which there is a good linear relationship with gas concentration ranging from 0 to 20,000; When the concentration is below 20, it belongs to the noise area, indicating that the concentration is too low and tends to the lower limit of measurement; Above 4000, it indicates that it is close to optical saturation absorption and reaches the upper limit of measurement. In addition, if the algorithm cannot be calculated when the input signal is too high, too low or morphological abnormal, it will return prompt information.

After completing the parameter setting, any Linear Factor can be set in TDLAS, and WMS results will be multiplied by this value, and the final output results will be used to compare the real experimental parameters.

After a single WMS measurement is successful, a continuous WMS measurement can be performed by using a USB, communication, or 485Modbus mode. Please refer to "USB Communication Protocol" and "Industrial Application" documents for details. In USB communication mode, the client starts or stops continuous measurement through meas on and meas off. Since the interaction on the upper computer is only the final result, a large amount of data communication is avoided, so the high-speed continuous work can be performed.