Interferometric sound recording with a glass window

1. INTRODUCTION

The **PICO**SCALE *Interferometer* is a versatile instrument to record displacements of targets. Due to the Michelson principle, the reflectivity of the targets is not crucial. Thus, measurements on glass windows can be realized with ease.

Figure 1. *Experimental setup. A* **PICO**SCALE *focusing sensor head is directed on a microscope slide and tracks its vibrations.*

2. EXPERIMENT

A **PICO**SCALE focusing sensor head (PS-SH-F01-10) was directed to a microscope slide (1 mm thick glass window), see Figure 1. Due to the large angular tolerance of the sensor head (about ±2°) no alignment mount is required and the system got reasonable signal after minor adjustments. Consequently, the **PICO**SCALE measures the motion of the glass surface, which is excited by any kind of acoustic and mechanical waves. The graphical user interface was configured to record a stream of position data with a frame rate of 39 kHz. Then, the setup was placed next to a laptop and a human voice was output via the internal loudspeakers of the laptop[1]. The data stream was stopped and the data analyzed with a simple python program[2]. Data processing consisted of only very basic functions:

1. Read in the data
2. Apply high-pass filter (5th order, Butterworth, corner frequency 400 Hz
3. Apply low-pass filter (5th order, Butterworth, corner frequency 4 kHz

The processed data are shown in Figure 2.

[1] the author of this note was too shy to use his own voice
[2] program available on request

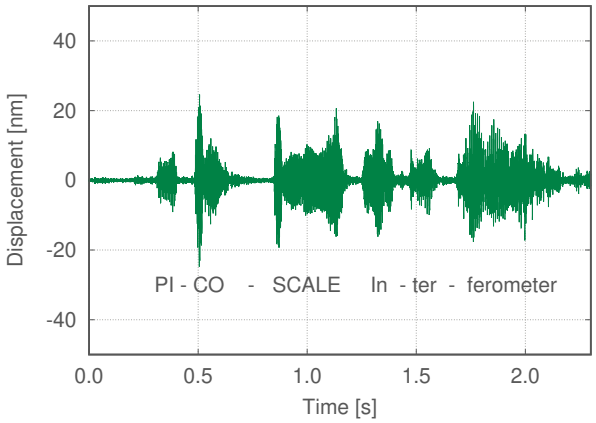

Figure 2. *Recorded signal after bandpass filtering. The recorded voice can be clearly seen!*

Finally, the data were converted to a *.wav file using python's wavfile module, so that the data can be made audible again[3].

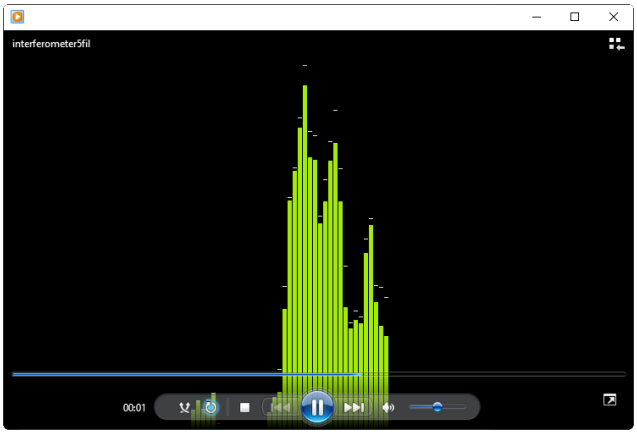

Figure 3. *The data of Figure 2 converted into a *.wav file and made audible!*

3. CONCLUSION

This application note demonstrates that **PICO**SCALE displacement data are already easily obtained by directing a focusing sensor head to a glass window. Data streams can be directly streamed into files and post-processing is straightforward. Please contact us to discuss your certainly more advanced applications!

[3] file available on our homepage

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