

## Linearity of the Mössbauer spectrum velocity scale evaluation utilizing laser vibrometer

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A linearity of the Mössbauer spectrometer velocity scale is evaluated. Non-contact method for measurement the mechanical displacement of the moving part in the double-loudspeaker type velocity transducer is presented. For this purposes the laser vibrometer based on Keyence LK-G5000 system has been utilized (Figure 1). Real displacement ( $\mu\text{m}$ ), velocity ( $\text{mm/s}$ ) and acceleration ( $\text{mm/s}^2$ ) of Mössbauer source were recorded for the analysis (Figure 2). Velocity driving system of the spectrometer is based on digital PID controller concept [1,2] deployed in FPGA chip on sbRIO real-time hardware device (National Instruments). Moreover, the vibrometer output signals are connected to the controller and evaluated there. The reference distance and displacement measurement range is  $20 \pm 3$  mm with the repeatability of  $0.02 \mu\text{m}$ . The results show the possibility to use the proposed system for velocity scale linearity evaluation. This feature has a big importance when measurements in external magnetic field are performed and real velocity can be distorted comparing to the expected shape. This will be pointed out in discussion.



Figure 1: Laser vibrometer utilization in the velocity scale linearity evaluation process.

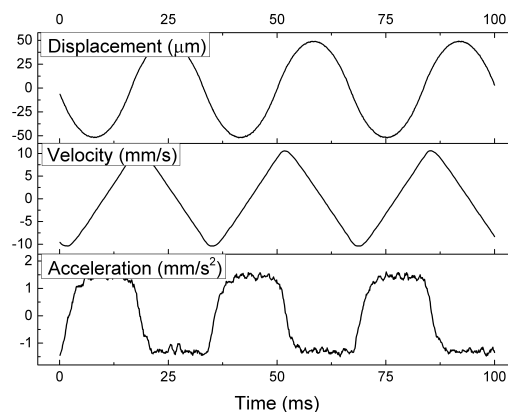


Figure 2: Real displacement ( $\mu\text{m}$ ), velocity ( $\text{mm/s}$ ) and acceleration ( $\text{mm/s}^2$ ) of the Mössbauer source

### References

- [1] P. Kohout et al., AIP Conf. Proc. **1622**, 50-57 (2014)
- [2] J. Pechousek et al. Meas. Sci. Technol. **20** 017001 (4pp) (2009)