PhD position: Laser ultrasound methods for industrial applications

The Institute of Physics, University of Graz is seeking a PhD candidate to work for three years on a project on non-destructive testing of railway wheelset axles with the help of laser-induced surface acoustic waves. The PhD project is part of collaboration with the Materials Center Leoben and two national industrial partners, aiming at a better maintenance and an optimization of inspection intervals of railway components and is funded by the Austrian Research Promotion Agency (FFG*)*.

Laser-ultrasound makes it possible to inspect materials nondestructively and remotely due to the optical excitation and measurement of various kinds of acoustic modes. In the envisaged application, the propagation speed and dispersion of surface acoustic waves will be exploited to measure residual stresses and their depth profiles in the steel axles. These stresses are introduced into the steel parts during production and play an important role in extending the life cycle of the axles. The PhD project will give the opportunity to work experimentally in the field of optics and acoustics and will offer ample opportunities to explore novel measurement and data processing techniques.

Your tasks:

- Design and build a measurement setup for laser ultrasound generation and detection in steel samples, combining optical excitation and detection and a method to generate mechanical stress in the targets.
- Using the setup, explore different modes of optical excitation, such as projection of lines or periodical patterns onto the sample surface.
- Optimize the optical detection method in order to measure the extremely small variations in the sound speed.
- Perform supporting simulations of wave propagation to explore the influence of elastic stresses on acoustic waves.
- Develop signal processing tools to extract dispersion curves and related stress profiles from the measured ultrasound signals.
- Perform measurements on pre-conditioned steel samples provided by the project partners.

Your profile:

- Master's degree, preferably in physics or advanced materials science.
- Strong interest in experimental techniques in the field of optics and acoustics
- Experience in signal processing, as well as programming skills are desired
- Good command in written and spoken English

We offer:

- Participation in an exciting research project at the interface of science and industry
- A research position for a duration of three years, starting in April 2023
- The opportunity to work in a research group devoted to cutting edge topics in optics, acoustics and biomedical imaging

Please send your application including a motivation letter with a description of research interests, a detailed curriculum vitae and the name and contact detail of at least one referee per E-mail to:
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