



PhD position Thermographic Reconstruction

RECENDT is an internationally renowned research center in the field of material characterization and non-destructive material testing. We pursue application-oriented fundamental research and also the implementation of the results in industrial applications.

The advertised post is funded by the Marie Skłodowska Curie Action within the framework of the Innovative Training Network scheme H2020-MSCA-ITN-2016. The duration of the fixed-term contract is 36 months and the earliest starting date is **9th January 2017**.

The “NDTonAIR” consortium involves Universities, Research Organisations and major European companies working on new Non-Destructive Testing (NDT) and Structural Health Monitoring (SHM) techniques for aerospace, of which both are key technologies. The goal is to train a new generation of scientists and engineers with a wide background of theoretical and experimental skills, capable of developing their research and entrepreneurial activities both in academy and industry and playing an active role in promoting the importance of quality inspection and structural monitoring in aerospace components. For more details also see: www.ndtonair.eu.

Objectives: In non-destructive evaluation using infrared thermography the aim is to reconstruct subsurface structures or properties from measured surface temperature evolution. This is an ill-posed inverse problem and usually at larger depths spatial resolution gets worse compared to structures near the surface. In this project new results from non-equilibrium thermodynamics (“fluctuation relations” like Jarzynski or Crooks relations) are used to describe this degradation in spatial resolution for various excitation patterns (pulsed, periodic (“lock-in”), chirped, like in Radar technology or codes, like Golay code). Increasing the signal-to-noise ratio for the measured surface temperature and therefore getting a better spatial resolution at a certain depth can be done by using more measurement time, e.g. by averaging over several pulse measurements.

Expected Results:

- Thermodynamic limits of spatial resolution as a function of depth for different excitation patterns: pulsed, periodic (“lock-in”), chirped, like in Radar technology or codes, like Golay code
- Different boundary conditions, like adiabatic or third kind (heat loss proportional to the temperature difference between surface and ambient temperature)
- Influence of additional noise from infrared camera or electronic noise on spatial resolution
- Semi-transparent samples instead of opaque samples
- Various excitation methods, like vibrothermography technique or inductive heating
- Finding of optimal excitation codes by an information theoretical approach (“channel coding”)

Planned secondment: to Leuven to use vibrothermography technique; to Dresden (IKTS) for inductive heating

Relevant Qualifications:

- M.Sc. or equivalent degree in Engineering or Physics

The successful candidate must

- be in the first four years (full-time equivalent research experience) of her/his research career, since e.g. completion of her/his masters' degree,
- not already possess a doctorate degree,
- not have resided or carried out his/her main activity (work, studies etc.) in Austria for more than 12 months in the 3 years immediately prior to the time of recruitment.

Relevant Experience:

- Practical experience with optical setups
- Basic knowledge on Pulsed Thermography
- Skills in regularization of inverse problems are beneficial
- Programming experience (Matlab or C)

Communication and Interpersonal Skills:

- Very good organisational skills
- Willingness to undertake interdisciplinary research
- Willingness for secondments at partners in Leuven and Dresden
- Fluent in written and spoken English and/or German

Benefits:

- Gross annual salary (Living allowance): EUR 29.988,--
- Mobility allowance: EUR 600,-- per month / free of tax (Contribution to household, relocation and personal travel expenses)
- Family allowance: EUR 500,-- per month (for fellows who have family at the time of recruitment – i.e. persons linked to the fellow by marriage or a relationship with equivalent status or dependent children who are actually being maintained by the fellow)

For more details for this position, please contact:

Dr. Peter Burgholzer (peter.burgholzer@recendt.at)

Candidates interested in the position should **send their applications via e-mail** to:

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