

SOUND INSULATION OF BUILDING ENVELOPE COMPONENTS BASED ON ACOUSTIC METAMATERIALS

PhD VACANCY
(ref. KFB_2022_DC5)

This PhD focuses on the sound insulation of building envelope components based on acoustic metamaterials, and fits in the framework of the ACTAREBUILD EU - DN - project. See project website: <https://actarebuild.eu/>

This interdisciplinary research is hosted by KFB Acoustics, Wroclaw, Poland. Academic supervision will be provided by Prof. Elke Deckers (Mecha(tro)nic System Dynamics (LMSD), Diepenbeek Campus, Department of Mechanical Engineering) and Prof. Christ Glorieux (Laboratory of Acoustics in the Soft Matter and Biophysics Unit of the Department of Physics and Astronomy) at KU Leuven, Belgium, and Dr. Daniel Urban of the Faculty of Civil Engineering of the Slovak Technical University (STU) in Bratislava, Slovakia. The joint PhD degree will be awarded at KU Leuven and STU Bratislava.

VACANCY DESCRIPTION

Adaptation of building envelope components in the revitalization process of office buildings to dwelling opens several acoustic and thermal challenges, both for the indoor and outdoor environment. Sound insulation properties of building envelope components are crucial for a proper acoustic comfort indoors.

The noise present in urban areas is known to dramatically increase when so-called street canyons are formed by arrays of tall buildings, typically in financial districts with office buildings, which consequently affects the indoor environment. Considering acoustic metamaterials in building envelope components can be a feasible and effective solution to optimize the noise level, as these innovative systems introduce new physical phenomena that can be tuned in frequency in order to mitigate noise. Specific tonal components, such as e.g. tram squealing noise, can thus be effectively filtered. In this PhD project we will examine the impact of novel components integrating metamaterials for the reduction of urban noise in buildings. The main task of the student will be the design of the resonant inclusions, the optimisation of (1) the element size, (2) the number of elements and (3) their position on the building envelope components to reach the desired noise reducing effect. The optimisation will be validated using acoustic measurements on prototypes, supported by computer simulations.

BENEFITS

- A remuneration package in line with Marie Skłodowska Curie Doctoral Network regulations, which is competitive with industry standards in Belgium, a country with a high quality of life and excellent health care system.
- The researcher allowances granted by Europe will cover all (employer's and employee's) taxes and contributions; the exact (net) salary will be confirmed upon appointment.
- An opportunity to pursue a PhD in Science, in a stimulating and ambitious research environment, with 3 years funding within the ACTAREBUILD ITN project. This PhD will be performed in collaboration with KU Leuven (Belgium) and STU Bratislava (Slovakia) and the candidate will be awarded by a joint PhD degree.
- An opportunity to work within a challenging European research project with leading industry players across Europe.
- KFB Acoustics offers research and consulting services in noise management, product development and environmental sector. For over a decade it has been solving complex noise and vibration problems and providing complete product development services to the world's leading organizations across all industries. The company's growth has led to the development of Acoustic Research and Innovation Centre – ARIC. Its infrastructure combines laboratories and numerous acoustical chambers that enable acoustic research in various fields. With a community of engineers and scientists, excellent laboratory equipment, and state-of-the-art measurement and analysis methods, ARIC may serve as a top class facility to commercial, educational and scientific applications. Along with the access to ARIC full infrastructure and specialized equipment and software, the candidate may count on the support of the team of experts. Moreover, KFB Acoustics has created a Scientific Advisory Board (SAB), which is composed of researchers and professors from all over the world. The members of SAB are recognized experts in different fields of acoustics, such as metamaterials, building acoustics or vehicle noise, among others, and serve the company with their expertise. In addition, since 2016, KFB Acoustics has been a member of the Acoustics Committee of the Polish Academy of Sciences. Also, the company is an owner of acoustics e-learning platform <https://acoucou.org>.

More information about the company can be found at:

<https://kfb-acoustics.com/>
<https://kfb-acoustics.com/partner/#aric>
<https://pl.linkedin.com/company/kfb-acoustics>

- Exchange visits with the academic partners at KU Leuven (Mecha(tro)nic System Dynamics (LMSD), Diepenbeek Campus, Department of Mechanical Engineering and Laboratory of Acoustics at the Department of Physics and Astronomy), in a vibrant environment in the hearth of Europe. Leuven is a town of approximately 100000 inhabitants, located close to Brussels (25km), and 20 minutes by train from Brussels International Airport. This strategic positioning and the strong presence of the university, international research centers, and industry, lead to a safe town with high quality of life, welcome to non-Dutch speaking people and with ample opportunities for social and sport activities. The mixture of cultures and research fields are some of the ingredients making the university of Leuven the most innovative university in Europe. Further information can be found on the website of the university: <https://www.kuleuven.be/english/living>

- Exchange visits with the academic partners at the Department of Materials Engineering and Physics at Slovak Technical University, Bratislava, Slovakia (STUBA). STUBA is a modern educational and scientific institution. Since its foundation in the year 1937 more than 159.000 students have graduated. In average, 12.000 students study at the STU every year. The research group involved in the project disposes of facilities as special room equipped for subjective perception of sound in terms of listening tests, prediction software for urban acoustics, software based on FEM and BEM for solving multiphysical tasks, software for measurement processing as well as measurement performing, a measurement setup as A class measurement sound analyser for room acoustic, building acoustic and environmental measurements, powerful omnidirectional sound source, accelerometers with calibrated multichannel DAQ (vibrometry multichannel system); intensity measurement chain, sound absorption measurement setup for small samples, dynamic stiffness measurement setup, modal analysis measurement setup. Further information can be found on the website of the university:
https://www.stuba.sk/english.html?page_id=132

ELIGIBILITY CRITERIA

If you recognize yourself in the story below, then you have the profile that fits the project and the research group.

- I have a master degree in physics or engineering.
- I do not yet have a PhD.
- During the past 3 years I have not resided, studied or worked in Poland for more than 12 months.
- I am proficient in written and spoken English.
- During my courses or prior professional activities, I have gathered experience with acoustic testing, control, data-acquisition, numerical simulations and mathematical modeling and I have a profound interest in these topics.
- As PhD researcher, I perform research in a structured and scientifically sound manner. I read technical papers, understand the nuances between different theories and implement and improve methodologies myself.
- I work goal-oriented and have a getting-things-done attitude, always with scientific rigor.
- In frequent reporting, varying between weekly to monthly, I show the results that I have obtained and I give a well-founded interpretation of those results. I iterate on my work and my approach based on the feedback of my supervisors which steer the direction of my research.
- I feel comfortable working as a team member and I am eager to share my results to inspire my colleagues and be inspired by them.
- I value being part of a project that aims at finding sustainable solutions in the domain of building applications and I am eager to learn how academic research can be linked to industrial innovation roadmaps.
- During my PhD I want to grow towards following up the project that I am involved in and representing the research group on project meetings or conferences. I see these events as an occasion to disseminate my work to an audience of international experts and research colleagues, and to learn about the larger context of my research and the research project

APPLY NOW !

1. Before submitting your application, make sure you are eligible to apply.
2. Prepare the following documents in English:
 - Curriculum Vitae (including your contact address, work experience, publications, as well as all other academic achievements)
 - Cover letter explaining your motivation
 - Transcript of all courses and grades for your Bachelor and Master program
 - A short description of your master's work (max 1 page)
3. Submit your documents by sending an email to sciencecareers@kfb-acoustics.com and use a title "ACTAREBUILD_DC5_name_surname".

Please add below statement to your application:

„I hereby grant consent for the processing of my personal data contained in this form by KFB Acoustics sp. z o.o. with its registered in Wrocław for the purpose of conducting the recruitment process, pursuant to the Act of August 29, 1997 on the protection of personal data (i.e. of 2016, item 922) ”.

Please be advised that the data administrator is KFB Acoustics sp. Z o.o. with headquarters in Wrocław at ul. Mydlana 7. Data is collected for the purposes of recruitment. You have the right to access your data and correct it. Providing data in the scope specified by the provisions of the Act of June 26, 1974, the Labor Code and implementing acts is obligatory. Providing additional personal data is voluntary.

For more information please contact us on sciencecareers@kfb-acoustics.com or +48 697 908 482.