Opening for Post-doc position – research related to phenomenon of elastic waves propagation

In the frame of OPUS project entitled: *"Study of elastic wave mode sensing and separation using FBG sensors for structural health monitoring"*, UMO-2020/39/B/ST8/01753 funded by the National Science Centre, Poland

Institute of Fluid-Flow Machinery, Polish Academy of Sciences, Gdańsk, Poland

About the position and project

We are looking for a talented person holding PhD title, who is interested in continuing his scientific work. The research will be realised at the Department of Mechanics of Intelligent Structures.

This research project is related to the study of optical strain sensor based on fibre Bragg gratings (FBG) application for symmetric and antisymmetric elastic guided wave mode sensing and mode separation. Guided wave propagation phenomenon is utilised in Structural Health Monitoring (SHM) systems for damage detection and localisation problems. Damage in the structure is a source of changes in elastic wave propagation. Based on registered changes in wave propagation and its processing it is possible to detect and localise damage. Very often elastic waves are excited and sensed using piezoelectric transducers. In the case of elastic wave sensing optical strain sensors based on Bragg gratings (FBG) are utilised since some period of time

The aim of this research project is study of FBG sensors sensitivity to symmetric and antisymmetric elastic wave modes and possibility of sensing the effects of interaction of these modes with damage in the structure (reflections, and especially mode conversions). Research will be related to the separation of symmetric and antisymmetric modes due to different placement of FBG sensors (top and bottom surface). Results related to wave sensing obtained by FBG sensors will be compared with results obtained by piezoelectric sensors taking in consideration the possibility of damage detection.

Research will be also related to connection of elastic wave sensing techniques based on piezoelectric and FBG optical sensors in order to improve the effectiveness of damage detection method. Piezoelectric based elastic wave sensors are influenced by electromagnetic interferences induced during the elastic wave excitation by piezoelectric actuator. This may lead to problems with damage detection and localisation. Aim of the project will be the development and validation of the hybrid piezoelectric-fibre Bragg grating (PT-FBG) elastic wave sensing method.

The offer

We offer a Post-doc position for 16 months - in the Department of Mechanics of Intelligent Structures, IMP PAN Gdańsk, Poland (http://www.imp.gda.pl/en/o4/z1/).

Salary is at least 7500 PLN gross (before taxes)

Eligibility criteria

1. PhD in mechanical engineering, material science, physics or related fields.
2. The PhD degree should be granted by other institution than Institute of Fluid-Flow Machinery, Polish Academy of Sciences
3. The PhD degree should have been obtained not earlier than 7 years before 1 January of the year of joining the project.
4. Good knowledge of written and spoken English.
5. High motivation for scientific work and a strong commitment to research work.
6. Experience in research related to the project topic and methods (guided elastic waves propagation, experience in numerical modelling).
7. Experienced user of MATLAB
8. They will be employed for a period of at least 6 months;
9. At the time of receiving remuneration, they will not be receiving any other remuneration paid from the funds granted to research projects under NCN calls under the heading of direct costs;
10. In the period of receiving the remuneration they will be receiving no remuneration from another employer pursuant to an employment contract, including an employer with registered office outside of Poland;

Tasks

1. Performing of numerical simulations related to guided wave propagation
2. Numerical study of elastic wave interaction with damage
3. Analysis of elastic wave mode separation methods based on numerical simulations.
4. Measurements of elastic wave propagation using FBG strain sensors and piezoelectric transducers.
5. Samples and measurement setup preparation
6. Signal processing and results analysis.
7. Preparation of reports based on results analysis.
8. Preparation of journal and conference publications.
9. Presentation of results at scientific conferences related to research topics.
10. Communication and discussion of results within the research team.

Specific Requirements

We especially seek candidates who:

- possess knowledge about measurements/experimental techniques

- have programming skills,
- knowledge about FEM software
- mobility and flexibility for conference travels.

In addition, the following competences are desired:

- knowledge of MATLAB software is desirable
- knowledge of COMSOL software is desirable
- elastic wave propagation modelling
- measurement techniques for FBG optic strain sensors/piezoelectric transducers/laser vibrometry
- the prizes and distinctions of the candidate resulting from the research carried out.

Selection procedure

Selection process is in accordance to National Science Centre regulations.

1. Submission of applications is possible through **10th May 2024**.
2. The results of the recruitment will be published by 31st May 2024
3. Form of applications: Applications in English can be sent by e-mail to **tomaszw@imp.gda.pl** with a subject **"Post-doc in OPUS 2020/39/B/ST8/01753 application - research related to phenomenon of elastic waves propagation".**
4. The candidate is expected to join latest by 1st September 2024.
5. Candidates interested in applying for the positions should submit the following documents:
   - Cover letter
   - CV / scientific resume
   - copy of the PhD diploma or other proof of holding the PhD degree.
   - the list of scientific achievements (publications, participation in research projects, participation in conferences, awards, scientific stays, scholarships, etc.)
   - optional: letter(s) of recommendation obtained from people (e.g. supervisors, former managers) directly cooperating with the candidate.
6. The application must contain information about the educational background and work experience.
7. Please, attach the requested documents in the PDF format.
8. During the recruitment process the selected candidates may be invited for an interview (in person or via internet).
9. The result of the recruitment procedure will be sent to the candidates via email.
10. Please include in the application the following statement:

    "I hereby authorize to process my personal data included in my application for the needs of the recruitment process (in accordance with the Act of 08.20.1997 r. on personal data protection - Dz. U. No 133, item 883)".

If needed, selected Candidates may be invited for an interview (in person or via videoconference on Internet).

There are no additional funds for the relocation costs, including visa issues, relocation of family, etc.

Additional questions could be sent by email to Tomasz Wandowski: tomaszw@imp.gda.pl