Thesis Project Offer

Joint Research and Education Programme “Palestinian-German Science Bridge PGSB”
Forschungszentrum Jülich GmbH & Palestine Academy for Science and Technology

Thesis type*

- [ ] BSc  - [ ] MSc  - [x] PhD

Intended starting date (approx.): [ ]

Contact details of supervisor/responsible host at Forschungszentrum Jülich

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<tr>
<th>Title*</th>
<th>Degree</th>
<th>First name*</th>
<th>Surname*</th>
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<tr>
<td>Mr.</td>
<td>Prof.</td>
<td>Dr. Ghaleb</td>
<td>Natour</td>
</tr>
</tbody>
</table>

Phone*  E-mail*
+49 2461 615045  g.natour@fz-juelich.de

Function*  Institute and homepage of institute*

Director  Central Institute of Engineering, Electronics and Analytics – Engineering and Technology (ZEA-1)
http://www.fz-juelich.de/zea/zea-1/EN

University affiliation in Germany*

RWTH Aachen, Faculty for Mechanical Engineering

Co-Supervisor at Palestinian university (if applicable)

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Phone  E-mail

University/institution  Department/faculty/institute

Project description*

Thermal image processing for carbon-based material analysis

The Central Institute of Engineering, Electronics and Analytics – Engineering and Technology (ZEA-1) is a scientific technical institute of the Forschungszentrum Jülich GmbH. Mission of ZEA-1 is the design, the development, and the fabrication of scientific and technical equipment, instruments, and processes that are essential for excellent science but are not commercially available.

The core competencies of ZEA-1 are technology development and mechanical engineering of equipment, spectrometers and other components for research using neutron, photon, and hadron beams, for energy and environment research, for soil and plant investigations and for the neuroscience. ZEA-1 has broad and longtime experiences in innovative manufacturing techniques, joining technologies, measurement technologies, automation, and calculation and numerical simulation methods.

In the framework of the “Palestinian-German Science Bridge” education program we offer a fellowship for a master thesis:
Thermal image processing for carbon-based material analysis

A modern support structure of particle detectors fulfills a variety of tasks. Essentially the stability and the dimensional accuracy of a detector system are ensured by the support structure. In addition to static tasks more demands are placed, for example, the cooling of detectors and front-end electronics. At the same time the detected particle flow should be mostly unaffected by structural materials. To satisfy all these requirements, modern support structures are developed, made of new materials and coupled with an intelligent construction design. Quality inspection is done with active thermographic methods, which allows a non-destructive testing of carbon-based fiber composites. An important factor for detection of material defect is the thermographic image analysis.

The following tasks have to be done: Assembling of a reference experiment using active thermography with pulse and/or periodic excitation sources. For each pulse excitation, time depending cooling curves should be calculated for all pixel queues. All pixel based cooling functions should be compared with each other, concerning the classification of defects. During periodic excitation a FFT algorithm should be used to calculate the amplitude and phase of the temperature function for each pixel queue, in consideration of defect finding. Finally both methods have to be compared.

Date* | Signature*
---|---
27.10.2017 | Prof. Dr. G. Natour

* required field