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  ☐ PhD  Intended starting date (approx.): 

Contact details of supervisor/responsible host at Forschungszentrum Jülich

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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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University/institution  Department/faculty/institute

Project description*

Mechanical design of advanced chopper systems for neutron and synchrotron beamlines using discs made of carbon fiber reinforced plastics (CFRP)

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 about mechanical design of advanced chopper systems for neutron...
and synchrotron beamlines using discs made of carbon fiber reinforced plastics (CFRP).

A chopper is essentially a disk rotated at high speed in vacuum with one or more ‘windows’, which a beam (e.g. a neutron beam) can pass unhampered at particular points in time. By arranging several choppers in a row, pulses of certain velocities / energies can be selected.

At ZEA-1 maintenance-free magnetic bearings are often used for such chopper systems. Beside the design of disks made of CFRP and of chopper housings, that are able to safely withstand a disk crash, the rotor-dynamic design of such chopper systems is a challenging task.

Within the project numerical approaches for rotor-dynamic investigations considering special features of CFRP disks have to be developed and validated by experiments. Various effects on instability problems of the chopper systems have to be investigated and solutions for such problems have to be developed and assessed.

Both numerical simulations as well as experiments have to be performed.

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

* required field