



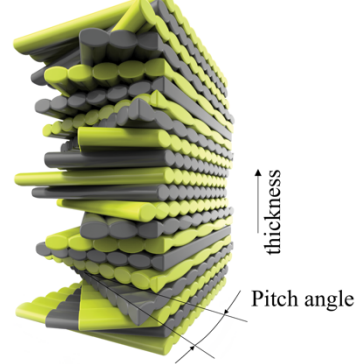
Creatures featuring Helicoid microstructures



Diffused subcritical matrix cracks (white)



Schematic of Helicoid stack



Position: Postdoctoral Researcher in Biomimetic Fiber-Reinforced Composites

Location: Purdue University, West Lafayette, Indiana, USA

Supervisor: Professor Pablo Zavattieri in collaboration with Helicoid Ind.

The Multi-Scale Mechanics and Materials by Design Lab at Purdue University is seeking a highly motivated and talented individual to fill a postdoctoral research position in the field of biomimetic fiber-reinforced composites. This position offers a unique opportunity to work closely with Professor Zavattieri and collaborate with leading companies in the composites industry, focusing on a novel application of these materials. The successful candidate will join a vibrant team of scientists and engineers, which includes researchers from two companies and another university.

Project Description: The postdoctoral researcher will be responsible for optimizing material architecture for impact-resistant biomimetic fiber-reinforced composites using advanced finite element analysis (FEA) tools. The project aims to develop and refine numerical models, specifically focusing on the fracture and damage behavior of fiber-reinforced composites under extreme impact conditions and fatigue. The researcher will utilize computational solid mechanics and finite element methods, preferably with experience in using Abaqus, Python, Fortran as well as cohesive zone models. The project will include the deployment and performance evaluation of the developed models into a full-scale component. The modeling activities will result in a tool which can be used to design and verify advanced composite parts subjected to extreme loading conditions. Additionally, knowledge and experience in material characterization and fracture experiments are required.

The Purdue University's team, led by Professor Zavattieri, has extensive experience working with helicoidal biological and bio-inspired composites, and other natural systems for the last 15 years. The team has developed extensive expertise in FEA and analytical modeling to predict mechanical and failure performance of helicoid-inspired architectures. As part of this project, Purdue will collaborate with Helicoid Ind (<https://www.helicoidind.com>), a leading company in the field, to refine the numerical tool and implement a fatigue module. The postdoctoral researcher will closely



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collaborate with the team to carry out the numerical analysis based on AD/FEA model and implement fatigue analytical strategies.

Responsibilities:

1. Conduct research on the optimization of material architecture for impact-resistant biomimetic fiber-reinforced composites.
2. Refine and develop numerical models using advanced finite element methods (preferably Abaqus).
3. Collaborate with the team to implement fatigue analytical strategies.
4. Conduct material characterization and fracture experiments.
5. Analyze and interpret research data.
6. To take initiatives in the planning of research
7. Prepare technical reports, publications, and presentations.
8. Collaborate with industry partners and researchers from other institutions.

Requirements:

- A Ph.D. degree in Mechanical, Aerospace, Civil Engineering, Materials Science, or a related field.
- Strong background and experience in computational solid mechanics.
- Proficiency in finite element methods, preferably using Abaqus.
- Knowledge and experience in fracture and damage behavior of fiber-reinforced composites materials.
- Experience in material characterization and running fracture experiments.
- Excellent programming skills (Python, Fortran, MATLAB, or similar).
- Strong analytical and problem-solving abilities.
- Effective communication and collaboration skills.
- Ability to work both independently and as part of a multidisciplinary team.

Duration and Support:

The initial appointment for this position is for one year, with the possibility of renewal based on performance and availability of funding. The postdoctoral researcher will receive a competitive salary commensurate with qualifications and experience, along with benefits. Purdue University provides access to state-of-the-art computational resources through the Purdue RCAC center, including high-performance computing (HPC) capabilities and Abaqus licenses.

Application Instructions:

Interested candidates should submit the following documents:

- Curriculum vitae (CV) including a list of publications.
- A cover letter describing research experience, interests, and career goals.
- Contact information for at least three references.



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Applications should be submitted electronically to Professor Zavattieri at zavattieri.lab@gmail.com with the subject line "Postdoc Application - Biomimetic Fiber-Reinforced Composites." Review of applications will begin immediately after August 1st, 2023 and continue until the desired position is filled. Please note that only shortlisted candidates will be contacted.

About Purdue University: Purdue University is a renowned institution known for its excellence in research and innovation. The college of engineering and its schools have a strong reputation for pioneering advancements in various areas, in particular, materials engineering. As a postdoctoral researcher at Purdue, you will have access to world-class facilities and resources, including the computational resources of the Purdue RCAC center, which will support your research endeavors. Additionally, you will have the opportunity to collaborate with industry leaders and contribute to cutting-edge research in the field of biomimetic fiber-reinforced composites. Join our team at Purdue University and make a significant impact in the development of innovative composite materials with real-world applications. Be part of a collaborative and dynamic research environment where your expertise and contributions will be highly valued. Apply today and embark on an exciting journey of scientific discovery and technological advancement. Purdue University is an equal opportunity/equal access/affirmative action employer and encourages applications from individuals of diverse backgrounds.

Helicoid Ind. <https://youtu.be/borsgxxKMIw>