MOHAMMAD MYNUL HOSSAIN, PhD
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RESEARCH INTERESTS

- Hybrid multi-scale reinforced polymer composite fabrication and its characterization.
- Fatigue damage behavior and life prediction of materials and structures.
- Light-weight materials and structures, and their damage behavior.
- Processing and characterization of electrospun nanofibers reinforced materials for structural and sensor application.
- Finite Element Stress Analysis.
- Low velocity impact damage behavior of fiber reinforced laminate and sandwich composite.

EDUCATION

- **Ph.D.**, Mechanical Engineering, North Carolina Agriculture&Technical State University, NC **May 2013**
  Thesis: "Fatigue characterization of fire resistant syntactic foam core material".
- **M.S.** in Mechanical Engineering, Kongju National University, South Korea **February 2008**
  Thesis: "Fabrication and characterization of PZT nanofibers by electrospinning method".
- **B.S.**, Mechanical Engineering**,** Bangladesh University of Engineering & Technology, Bangladesh **February 2004**
  Thesis: "Manufacturing and analyzing mechanical properties of jute fiber reinforced epoxy matrix composite plate".

RESEARCH EXPERIENCE

Post-Doctoral Research Associate, Composite Vehicle Research Center**,** Michigan State University **06/2013-Present**

- My post-doctoral research deals with improving the structural integrity and out of plane damage tolerance of S-2 glass fabrics/SC-15epoxy resin matrix laminate composite by using exfoliated graphene nano-platelet (xGnP) as a secondary reinforcement.
- Another research deals with design and development of an innovative light-weight composite material structure for a critical load bearing component in defense ground vehicle, which will be used to eliminate the metal component.

Research Assistant, Center for composite materials research, North Carolina A&T State University **08/2008-05/2013**

- My doctoral research was involved comprehensive fatigue characterization of a fire resistant syntactic foam core material called "Eco-Core" under compression-compression, shear and flexural stress states. Eco-Core is developed at Center for Composite Materials Research (CCMR) in North Carolina Agriculture & Technical State University and has the potential to be used in transportation industries as a fire and toxicity safe structural core. A fatigue damage model was developed to determine the fatigue life of Eco-Core for damage onset, progression and ultimate failure for three different stress states. A unique fatigue-life prediction analytical equation was developed. Finite element analysis of Eco-Core sandwich beam was performed using ANSYS to better understand the stress states at failure.

Research Assistant, Kongju National University, South Korea **03/2006 - 02/2008**

- My M.Sc thesis was involved fabrication and characterization of lead zirconate titanate (PZT) nanofibers by electrospinning method. Studied the effect of heat treatment, acidification (organic acid) of PZT sol-gel precursor, solvent concentration, and flow rate on morphology of the electrospun PZT nanofibers. Finally an optimized PZT sol-gel/PVAc mixture was established to fabricate PZT ceramic nanofibers with good morphology.
- In addition, I was directly involved in two different projects with two different Masters Students. One was to study the compressive fatigue behavior of Al-Alloy foam and another was to study the solid particle erosion behavior of carbon fiber reinforced plastic (CFRP).

TEACHING EXPERIENCE

Teaching Assistant, Department of Mechanical Engineering, NC A&T State University **08/2008 - 05/2010**

- Coordinate with the professor to taught make up class and give class assignments to students. Performed grading class assignments and exam papers.

Mentor, Center for Composite Materials Research, NC A&T State University **06/2011 - 08/2011**

- Demonstrated middle-school students how to use guarded heat flow meter (GHFM) method for measuring the thermal conductivity of aluminum, copper, stainless steel, and glass-mica.

Mentor, Center for Composite Materials Research, NC A&T State University **06/2012 - 07/2012**

- Demonstrated middle-school students how to design sandwich flexural test specimen, conduct static and fatigue test, and collect and process the data to determine the flexural static strength and fatigue life.

WORK EXPERIENCE

Mechanical Engineer, Akij Cement Company, Dhaka, Bangladesh **04/2004 - 02/2006**

- Developed and executed a program for Planned and Preventive Maintenance, resulting in fewer breakdown of machinery, and greatly reduced overhead cost.
- Developed an operation model through analyzing manufacturing system, cost, and total production and executed it which greatly helped to keep the manufacturing cost within the budget.
- Supervised engineers and technicians involved in operation and maintenance of machinery as a shift in-charge.
- Designed small machine parts using AutoCAD.
- Maintained communications between different departments and high officials.

SKILLS & TRAINING

- ANSYS, ABAQUS, Solid Works, MATLAB, AutoCAD, Origin, KaleidaGraph, MS Office, SEM, TEM, XRD& FTIR data analysis.
- Office of Naval Research (ONR) "Solid Mechanics program", September 12-14, 2011, College Park, Maryland.
- U.S. Army –HBCU/MI Workshop, April 5-6, 2012, Williamsburg, Virginia.

AWARDS AND HONORS

- Scholarly accomplishments & excellence academic performance certificate from NC A&T State University.
- Research scholarship, Kongju National University, South Korea.
- Technical scholarship, Bangladesh University of Engineering and Technology.
- Honorary certificate from prime minister of Bangladesh for obtaining the 13^{th} position in the competitive Sceondary School Certificate (S.S.C) Examination.

PROFESSIONAL AFFILIATIONS & OUTREACH ACTIVITIES

- American Society of Mechanical Engineers (ASME)
- Reviewer for: ASME-IMECE 2013 conference, Journal of Mechanics Engineering and Automation.
- Vice president (2010-2011), Bangladesh student association (BSSO) in North Carolina A&T State University.
- Advisor (2013-2014), Association of Bangladesh Students and Scholars (ABSS), Michigan State University.
- Organize seminar in interdisciplinary team in Center for composite Materials research, NC A&T State University.

JOURNAL PUBLICATIONS

1. **Mohammad Mynul Hossain** and Kunigal Shivakumar. "Compression Fatigue performance of a fire resistant syntactic foam." Composite Structures, 94 (2011), 290-98.
2. **Mohammad Mynul Hossain** and Kunigal Shivakumar, "Shear fatigue characterization of fire resistant syntactic foam core sandwich beam" Journal of Sandwich Structures and Materials, 15(2013), 523-540.
3. **Mohammad Mynul Hossain** and Kunigal Shivakumar, "Flexural fatigue failure and lives of Eco-Core sandwich beams", Materials & Design, available online September 16, 2013, 55(2014), 830-836.
4. **Mynul Hossain** and Amkee Kim. "The effect of acetic acid on morphology of PZT nanofibers fabricated by electrospinning." Material letters, 63 (2009), 789-792.
5. **Mohammad Mynul Hossain** and Kunigal Shivakumar, "Overview of compression, shear, and flexure fatigue characterization of fire resistant syntactic foam core composite" (in review).
6. **Mohammad Mynul Hossain** and Kunigal Shivakumar, "Failure modes analysis in Eco-Core sandwich beam through Finite Element Analysis" (in review).

CONFERENCE PROCEEDING & PRESENTATIONS

1. **Mohammad Mynul Hossain** and Kunigal Shivakumar, "Shear fatigue characterization of fire resistant syntactic foam core composite sandwich panel" *Proceeding of SAMPE TECH 2012*, October 22-25, 2012, Charleston,

South Carolina, USA.

2. **Mohammad Mynul Hossain** and Kunigal Shivakumar, "Fatigue performance of a Fire Resistant Syntactic Foam Core Composite." *Proceeding of ICME 2011 conference*, ICME11-AM-038 (CD-R), December 18-20, Dhaka, Bangladesh.
3. **Mohammad Mynul Hossain** and Kunigal Shivakumar. "Compression-Compression Fatigue performance of a Fire Resistant Eco-Core." AIAA, 2010-2729, 2010, Orlando, Florida, USA.
4. **Mynul Hossain**, Kwan-Woo Shin, Amkee Kim. "Study on morphology of PZT nanofiber Fabricated by Electrospinning." Proceedings of KSME 2007 Fall Conference, Gangwon-Do, South Korea
5. **Mynul Hossain**, Ilhyun Kim, Kwan-Woo Shin, Amkee Kim. "Compressive fatigue strength of Al-alloy foam with different thickness." Advanced Nondestructive Evaluation 11: Proceedings of the International Conference on ANDE 2007, pp. 258-263, BUSAN, South Korea. (doi: 10.1142/9789812790194_0044).
6. Ilhyun Kim, **Mynul Hossain**, and Amkee Kim. "Thickness Effect on Compressive Fatigue Behavior of Al-Si-Ca Alloy Foam." Proceeding of KSME 2007 Spring Conference, pp. 179-182, 2007, South Korea.
7. Gil-do Jeong, **Mynul**, and Amkee Kim. "Study on Erosion Rate of CFRP." Proceeding of KSME 2006 Fall Conference, pp. 80-86, 2006.