Tinku Kumar Mahato

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Mechanical engineer with 2 years of experience in providing end to end solutions for the automotive industry in the domain of modelling & simulation. Ongoing PhD. work focused on understanding the fracture behavior of Ni-Ti Shape Memory Alloys through designed experiments and finite element based Computational Solid Mechanics.

Work Experience

- **Satyam Venture Engineering Services Private Limited.** **Hyderabad, Telangana**
  Ashoka My Home Chamber, S.P. Road, Secunderbad August 2017 - August 2019
  - Part of the CAE Group responsible for modeling crash boxes under impact loading conditions using CFRP, GFRP and steel for crashworthiness analysis.
  - Employed MAT_058 material model in LS-DYNA to simulate the behavior of composite laminates.
  - Conducted a comparative study of all three materials by computing strain energy absorption using load–displacement data.
  - Used HyperMesh for pre-processing and LS-DYNA as a solver.

Education

- **PhD. in Mechanical Engineering** **2019 – Present**
  Indian Institute of Science, Bengaluru
- **MTech in Mechanical Engineering** **2015 – 2017**
  Indian Institute of Technology, Kharagpur CGPA 8.15/10
- **BTech in Mechanical Engineering** **2010 – 2014**
  BIT, Sindri, Dhanbad CGPA 8.24/10
- **All India Secondary School Certificate Examination (12th), CBSE** **2009**
  GGPS, Bokaro steel city, Jharkhand 86.6%
- **All India Secondary School Examination (10th), CBSE** **2007**
  SSVM, Baghmara, Dhanbad, Jharkhand 90.6%

Key Courses

1. Solid Mechanics
2. Finite Element Methods
3. Non-linear Finite Element Methods
4. Mechanical behavior of materials

Software Skills

- Programming languages: FORTRAN, MATLAB
- Simulation Software: FEAP, LS-Dyna, ABAQUS
- Meshing Tools: Altair HyperMesh, MSC Patran

Projects

- **PhD. Thesis: Fracture and Indentation Behavior of Shape Memory Alloys**
  - Numerically investigated both fracture and indentation responses of SMAs using a thermomechanical constitutive model.
  - Implemented the model in FEAP, a FORTRAN-based finite element analysis program.
  - Performed 3D numerical simulations of mixed-mode (I and II) stationary notch tip fields in SMAs.
    - ❖ Investigated the effect of temperature, through-thickness, superelasticity (SE), and plasticity on the evolution of plastic and martensite volume fraction zones.
  - Carried out finite element analysis of void growth near a notch tip in a SMAs under mixed-mode loading.
    - ❖ Aimed to understand the mechanics of void growth and coalescence near the notch tip under mixed-mode loading as well as the influence of void location and phase transformation on the critical energy release rate.
  - Conducted mixed-mode fracture experiments on NiTi SMAs.
    - ❖ Studied the influence of mode-mixity on fracture toughness and the underlying fracture mechanisms.
    - ❖ Examined the effect of the initial phase (twinned martensite vs. austenite) on the fracture behavior under mixed-mode loading.
  - Performed numerical simulations of the spherical indentation response of superelastic–plastic thin films.
    - ❖ Studied load–depth response, evolution of martensite volume fraction and plastic strain, work recovery ratio, and hardness, and compared them with bulk sample.

- **MTech Thesis: Grinding of bearing steel with minimum quantity lubrication (MQL) and nano MQL**
  - Studied the effects of downfeed and MQL parameters (flow rate and back pressure) on grinding force, specific energy, surface roughness, and topography.

Publications

- **Tinku M**, N. Venkitachalam, J. Anuja and R. Narasimhan "Numerical simulations of spherical indentation of superelastic-plastic thin films", Thin. Solid. Films 756 (2022).
- **Tinku M,** and R. Narasimhan "A 3D numerical study of mixed mode (I and II) notch tip fields in shape memory alloys", International Journal of Fracture (2025).
- **Tinku M**, Baruah D, Agrawal S, Suwas S, Narasimhan R "Experimental investigation of mixed-mode fracture response of NiTi SMAs", manuscript prepared for Journal publication.
- **Tinku M,** and R. Narasimhan "Finite element analysis of void growth near a notch tip in a SMAs**",** manuscript prepared for Journal publication.

Conference presentations

- **Tinku M,** and R. Narasimhan, "A 3D numerical study of mixed mode (I and II) notch tip fields in shape memory alloys", 7th SDMMS, September 2023, UKM, Malaysia.