Ananya Bijaya

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Education

Indian Institute of Technology Roorkee — Roorkee, India
Ph.D. in Structural Engineering — *Jul 2018 – Present*

Columbia University — New York, USA
M.S. in Structural Engineering; ***CGPA: 3.6/4.0*** — *Aug 2013 – Dec 2014*

Amity University — Noida, India
B.Tech. in Civil Engineering; ***CGPA: 7.7/10.0*** — *Graduated May 2013*

Research Experience

Indian Institute for Technology Roorkee — Roorkee, Uttrakhand, India
Research Assistant — *Jul 2018 – Present*

Reduced-dimensional phase-field method (PFM)

- Proposed a one-dimensional PFM for beam fracture.
- Developed a user-defined element in ABAQUS, using UEL user subroutine, to implement the proposed approach.
- Developed python scripts for geometry generation and post-processing.

Anisotropic fracture toughness

- Developed a computational approach for determination of architected material's direction dependent fracture toughness.
- Implemented the proposed methodology in FEniCS.
- Investigated of macroscale direction-dependent fracture toughness for two type of architected materials.

Anisotropic PFM

- Proposed a modified Multi-PFM which rectified the issues with original model.
- Implemented the proposed model in ABAQUS using UEL user subroutine.

Thermodynamically-consistent PFM for dynamic fracture

- Proposed a thermodynamically consistent formulation for brittle and ductile fracture with capability of tracking failure mode transition phenomena.
- Implemented the proposed formulation through ABAQUS-explicit material subroutine VUMAT.
- Incorporated multi-threading in the VUMAT code.

Work Experience

Bridge Engineer
GM2 Associates Inc. (Glastonbury, CT, USA) — *Jan 2018 – Present*

- Responsible for design Bridge 03120 Bassett Road Over I-91, North Haven, CT.
- Responsible for replacement of Hunting Ridge Road Bridge over East Brach Mianus River.
- Conducted LRFR load ratings of multiple structures (I-395).

Graduate Teaching Assistant
Indian Institute of Technology Roorkee, Civil Department

- Finite element analysis (2019)
- Introduction to C++ (2019)

Publications

3 Ananya Bijaya, Shubhankar Roy Chowdhury, and Rajib Chowdhury. Reduced-dimensional phase-field theory for lattice fracture and its application in fracture toughness assessment of architected materials. *European Journal of Mechanics - A/Solids*, 100:104964, July 2023

2 Ananya Bijaya, Shubhankar Roy Chowdhury, and Rajib Chowdhury. Multiscale phase-field approach for investigation of anisotropic fracture properties of architected materials. *Mechanics of Materials*, 176:104528, January 2023

1 Ananya Bijaya and Shubhankar Roy Chowdhury. On failure mode transition: a phase field assisted non-equilibrium thermodynamics model for ductile and brittle fracture at finite strain. *Meccanica*, June 2020

Skills

Technical: Finite element analysis, multiscale mechanics, computational fracture mechanics

Programming: Python, Fortran, C++, Docker, NumPy, Pandas, pygmsh, Keras, Pytorch, scikit-learn, matplotlib

Finite element packages: FEniCS, Abaqus, Dealii

Communication: 3 first-authored publications

Leadership: Mentored and directed research for 1 Ph.D. student and 2 graduate students