Pattabhi Ramaiah Budarapu

Research Interests

Computational methods for fracture, adaptive multiscale methods and molecular dynamics, photo-voltaic solar cells, polymer nano-composites.

Education

Ph.D., Institute of Structural Mechanics, March 2010 - Jan 2015.
Thesis on "Adaptive multiscale methods for fracture" was submitted in June 2014.
Advisor: Prof. Timon Rabczuk.
Bauhaus University of Weimar, Weimar, Germany.

M.E., Department of Mechanical Engineering, Aug 2001 - Jan 2003
Sound radiation from clamped rectangular plate set in a baffle with attached masses: Theory and Experiment
Advisor: Prof. Venkata R. Sonti
Indian Institute of Science, Bangalore, India.

B.Tech., Department of Mechanical Engineering, Aug 1996 - June 2000
Software development for the design and analysis of internal combustion engine crack shaft
Advisor: Prof. P. Kannaiah
Sri Venkateswara University College of Engineering, Tirupati, India.

Positions

Assistant Professor (visiting) — **Indian Institute of Technology Bhubaneswar**
School of Mechanical Sciences
July 2017 – Till date

Computational methods for multiscale fracture in multiphysics problems.

Post-doctoral Associate — **IMT School for Advanced Studies Lucca**
IMT School for Advanced Studies Lucca
Lucca, Italy
Mar. 2015 – Jan. 2017

Design and durability of photo-voltaic modules, in collaboration with **Prof. Marco Paggi.**

Scientific co-worker — **Bauhaus University of Weimar**
Institute of Structural Mechanics
Weimar, Germany
Mar. 2010 – July 2014

Adaptive multiscale methods for fracture, under the supervision of **Prof. Timon Rabczuk.**

Engineer — **John F Welch Technology Center, GE,**
Wind Energy
Bangalore, India
Nov. 2007 – Jan. 2010

Root Cause Analysis (RCA) studies and suggesting retrofits for wind turbine components.

Scientist — **DRDO**
Aeronautical Development Establishment
Bangalore, India
Sep. 2005 – Nov. 2007

Research and development of structural components for Unmanned Air Vehicles (UAV).

Design Engineer — **Bharat Heavy Electricals Limited**
Piping Center
Chennai, India
Aug. 2003 – June 2005

Design and analysis of equipment for thermal power plants.

Graduate Research Assistant — **Indian Institute of Science**
Department of Mechanical Engineering
Bangalore, India
Aug. 2001 – Jan. 2003

Sound radiation from clamped rectangular plate set in a baffle with attached masses: Theory and Experiment.

Honors/Awards

- Selected for the Post-doctoral position at IMT Lucca, under the European Research Council (ERC) grant **CA2PVM** "Multi-scale and multi-physics computational approach to

design and durability of photovoltaic modules", to work on design and durability aspects of photo-voltaic modules, from March 2015.

- Honored with over all grade of **Magna cum laude** for my performance in doctoral studies.
- Received the German graduate research assistantship during March 2013 - July 2014.
- Received the Marie Curie scholarship under FP7-PEOPLE-2010-IRSES for the project "Multiscale Methods for Fracture" (**MultiFrac, 269149**), International Research Staff Exchange Scheme (IRSES) to visit Indian Institute of Science (IISc), Bangalore, India, during Mar. 2013 - Jan. 2014.
- Selected as the scientific co-worker under the Deutsche Forschungsgemeinschaft (DFG) funding (grant no. **RA 1946/3-1**) during Mar. 2010 - Feb. 2013, to perform research in the area of multiscale methods for fracture at Bauhaus University of Weimar, Germany.
- **Project of the month** (Aug 2009) award for the Loosen Foundation Mounting (FMP) RCA, GE, Bangalore.
- **Six Sigma green belt** certified (Aug 2008) for developing Visual Basic (VB) based Fatigue Damage Calculation tool, to estimate the weld fatigue life incorporating pre-damage.
- Offered the **Assistant director** position in the Central Water Engineering Service, selected through the **Indian Engineering Services (IES)** examination, 2004.
- Recipient of **fellowship** including contingency funds from the Ministry of Human Resources and Development (MHRD), Government of India, throughout M.E. program at Indian Institute of Science, Bangalore, India (2001-2003).
- Secured All India $\mathbf{10}^{th}$ **Rank in GATE-2001** with a percentile of **99.87**.
- Received **national merit scholarship** from the Ministry of Human Resource Development (MHRD), India, at under graduate and pre-university levels.
- Completed the entire education with federal support on merit basis.

Professional activities

- Based on google scholar, my **H index is 10** with a total of 313 citations as on August 2017.
- Guest editor (along with Prof. T. Rabczuk), Special issue on "Multiscale Methods and Application to Computational Materials Design", **materials** journal, **Impact Factor 2.728**, released in October 2016.
  http://www.mdpi.com/journal/materials/special_issues/multiscale_methods_application
- **PR. Budarapu**, M. Paggi and T. Rabczuk. Mini-symposium on Multi-physics Simulation of Fracture in Energy Systems (MS609), WCCM XII & APCOM VI, 24–29 July 2016 Seoul, Korea. **http://wccm2016.org/**
- **Thesis guidance/collaboration**
  PhD
  Brahanandam Javvaji on "Plasmon-Phonon Coupling in Nano-crystalline structures", In collaboration with Prof. Roy Mahapatra, Department of Aerospace Engineering, Indian Institute of Science (IISc), Bangalore. Thesis submitted.

  YB. Sudhir Sastry on "Some studies on computer Aided Design and Analysis of Thin Walled Beams and Aircraft Structural Components", In collaboration with the Institute of Aeronautical Engineering, Hyderabad and Dr. Y. Krishna, Scientist G, DRDL, Hyderabad. Successfully defended on 20^{th} August 2016.

  Masters
  N. Madhavi, "Buckling analysis of thin wall stiffened composite panels", completed in June 2014, in collaboration with YB Sudhir Sastry at the Institute of Aeronautical Engineering, Hyderabad.
  S. Devaraj, "Studies on ballastic impact of the composite panels", completed in June 2014, in collaboration with YB Sudhir Sastry at the Institute of Aeronautical Engineering, Hyderabad.
  R. Natarajan, "Design and analysis of a morphing airfoil with auxetic structure", completed in June 2014, in collaboration with YB Sudhir Sastry at the Institute of Aeronautical Engineering, Hyderabad.

- **Teaching**
  1. *Vibrations (ME6L001), under progress*, Academic year 2017-18, for M.Tech students at IIT Bhubaneswar, India.
  2. *Advanced Mechanics of Solids and Materials, Continuum Mechanics and Fracture Mechanics*, Academic years 2015-16 and 2016-17 for graduate level students at IMT School for Advanced Studies Lucca, Italy.
  https://www.imtlucca.it/phd/2015-16/computer-science/courses
  https://www.imtlucca.it/phd/2016-17/computer-science/courses

- **Editorial board member:**
  Frontiers of Structural and Civil Engineering (Springer), from Jan 2017 onwards.

- **Reviewed** manuscripts for: Materials and Design (Elsevier, Impact factor **3.997**), Composite Structures (Elsevier, Impact factor **3.853**), Computer Methods in Applied Mechanics and Engineering (Elsevier, Impact factor **3.467**), Computational Mechanics (Springer, Impact factor **2.639**), International Journal of Impact Engineering (Elsevier, Impact factor **2.646**), Computers and Structures (Elsevier, Impact factor **2.134**), Computational Materials Science (Elsevier, Impact factor **2.086**), International Journal of Fracture (Springer, Impact factor **1.642**), International Journal of Computational Methods (World Scientific, Impact factor **1.123**), Journal of Computational Science (Elsevier, Impact factor **1.078**), Mathematical Problems in Engineering (Hindawi, Impact factor **0.762**), KSCE Journal of Civil Engineering (Springer, Impact factor **0.6**), Noise Control Engineering Journal (Institute of Noise Control Engineering) and Frontiers of Structural and Civil Engineering (Springer).

- Life member of Indian society for Advancement of materials and Processing Engineering (ISAMPE), India.
- Associate member of Aeronautical Society of India (ASI), India

Skills

- Modeling and simulation of polymer nano-composites, computational approaches for the design and durability of photo-voltaic solar cells, experimental validation, mathematical modeling of micro and nano-scale systems, development and validation of multiscale methods for fracture, application of the developed methods for practical problems, design and development of experiments, computational and experimental modeling of composite materials for several aerospace applications, suggesting the retrofits apart from design and development of equipment for thermal and wind energy applications.
- Computer expertise in numerical methods/analysis
  - *Languages*: C, FORTRAN and Matlab.
  - *Technical Software*: Microsoft Office, Latex, Tecplot, ANSYS, and MSC Nastran.
  - *Platforms*: Linux, Unix, and MS-Windows.
- Exceptional writing, data processing, and oral communication skills evidenced by delivery of both technically specialized and general interest presentations.

Journal Publications

Under review

17. **PR. Budarapu**, J. Reinoso, B. Javvaji, M. Paggi and T. Rabczuk, A three dimensional adaptive multiscale method for crack growth in Silicon, *Finite Elements in Analysis and Design*.

Published/accepted

16. S. Ojo, **PR. Budarapu** and M. Paggi, A nonlocal adaptive discrete empirical interpolation method combined with modified *hp*-refinement for order reduction of molecular dynamics systems, *Computational Material Science*, accepted. **Impact factor 2.292**

15. **PR. Budarapu** and T. Rabczuk, Multiscale methods for fracture: A review, *Journal of the Indian Institute of Science*, **97**(3), 2017. **Impact factor 0.493**

14. **PR. Budarapu**, J. Reinoso and M. Paggi. Concurrently coupled solid shell-based adaptive multiscale method for fracture, *Computer Methods in Applied Mechanics and Engineering*, **319**, 338-365, 2017. **Impact factor 3.949**, cited by **1**.

13. **PR. Budarapu,** B. Javvaji, VK. Sutrakar, D. Roy Mahapatra, M. Paggi, G. Zi, T. Rabczuk. Lattice orientation and crack size effect on the mechanical properties of Graphene, *International Journal of Fracture*, **203**(1), 81–98, 2017. DOI: 10.1007/s10704-016-0115-9, **Impact factor 2.247**, cited by **4**.

12. B. Javvaji, **PR. Budarapu,** VK. Sutrakar, D. Roy Mahapatra, M. Paggi, G. Zi, T. Rabczuk. Mechanical properties of Graphene: Molecular dynamics simulations correlated to continuum based scaling laws, *Computational Materials Science*, **125**, 319–327, 2016, DOI: 10.1016/j.commatsci.2016.08.016, **Impact factor 2.292**, cited by **4**.

11. **PR. Budarapu**, YB. Sudhir Sastry, R. Natarajan. Design concepts of an aircraft wing: composite and morphing airfoil with auxetic structures, *Frontiers of Structural and Civil Engineering*, **10**(4), 394–408, 2016, DOI: 10.1007/s11709-016-0352-z, **SCI**, cited by **8**.

10. **PR. Budarapu**, B. Javvaji, VK. Sutrakar, D. Roy Mahapatra, G. Zi, T. Rabczuk. Crack propagation in Graphene, *Journal of Applied Physics*, **118**, 064307, 2015, **Impact factor 2.276**, cited by **22**.

9. YB. Sudhir Sastry, **PR. Budarapu,** N. Madhavi and Y. Krishna. Buckling analysis of thin wall stiffened composite panels, *Computational Materials Science*, **96B**, 459–471, 2015. **Impact factor 2.292**, cited by **17**.

8. YB. Sudhir Sastry, Y. Krishna and **PR. Budarapu**. Parametric studies on buckling of thin walled channel beams, *Computational Materials Science*, **96B**, 416–424, 2015. **Impact factor 2.292**, cited by **18**.

7. **PR. Budarapu,** TSS. Narayana, B. Rammohan and T. Rabczuk. Directionality of sound radiation from rectangular panels, *Applied Acoustics*, **89**, 128–140, 2015. **Impact factor 1.921**, cited by **14**.

6. [SW. Yang, **PR. Budarapu**]^{equal}, DR. Mahapatra, SPA. Bordas, G. Zi and T. Rabczuk. A meshless adaptive multiscale method for fracture, *Computational Materials Science*, **96B**, 382–395, 2015. **Impact factor 2.292**, cited by **40**.

5. YB. Sudhir Sastry, **PR. Budarapu,** Y. Krishna and S. Devaraj. Studies on ballistic impact of the composite panels, *Theoretical and Applied Fracture Mechanics*, **72**, 2–12, 2014. **Impact factor 2.659**, cited by **24**.

4. **PR. Budarapu**, YB. Sudhir Sastry, B. Javvaji and DR. Mahapatra. Vibration Analysis of Multi-walled Carbon Nanotubes Embedded in Elastic Medium, *Frontiers of Structural and Civil Engineering*, vol **8**(2), 151–159, 2014. **SCI**, Cited by **22**.

3. **PR. Budarapu,** R. Gracie, SW. Yang, X. Zhaung and T. Rabczuk. Efficient Coarse Graining in Multiscale Modeling of Fracture, *Theoretical and Applied Fracture Mechanics*, vol **69**, 126–143, 2014. **Impact factor 2.659**, cited by **64**, highly cited as per Thomson Reuters.

2. **PR. Budarapu,** R. Gracie, SPA. Bordas and T. Rabczuk. An adaptive multiscale method for quasi-static crack growth, *Computational Mechanics*, vol **53**(6), 1129–1148, 2014. **Impact factor 2.861**, cited by **65**, highly cited as per Thomson Reuters.

1. **B. Pattabhi Ramaiah**, B. Rammohan, S. Vijay Kumar, D. Satish Babu and R. Raghuatnhan. Aero-elastic analysis of stiffened composite wing structure, *Journal of Vibration Engineering and Technologies (replaced with, Advances in Vibration Engineering)*, vol **8**(3), 255-264, 2009. Cited by **10**.

Mini-symposium

1. **PR. Budarapu**, M. Paggi and T. Rabczuk, Multi-physics Simulation of Fracture in Energy Systems (MS609), *WCCM XII & APCOM VI, 12th World congress on computational mechanics and 6th Asia-Pacific congress on computational mechanics*, 24-29 July 2016, Seoul, Korea.

Refereed Conference Proceedings

11. **PR. Budarapu** and M. Paggi. A three dimensional implicit monolithic finite element

formulation of the semiconductor device equations, *WCCM XII & APCOM VI, 12^{th} World congress on computational mechanics and 6^{th} Asia-Pacific congress on computational mechanics*, Seoul, Korea, 24-29 July 2016.

10. **PR. Budarapu**, J. Reinoso and M. Paggi. A three dimensional phantom node method to study complex fracture in Photo-voltaic cells, *EU PVSEC, 32^{nd} European PV Solar energy conference and Exhibition*, ICM - International Congress Center Munich, Germany, 20-24 June 2016.

9. **PR. Budarapu**, J. Reinoso, and M. Paggi. A three dimensional concurrently coupled adaptive multiscale method for fracture, *ECCOMAS Congress 2016, VII European Congress on Computational Methods in Applied Sciences and Engineering*, Crete Island, Greece, 5–10 June 2016.

8. **PR. Budarapu**, R. Gracie, T. Rabczuk, D. Qian, SPA. Bordas, An adaptive eXtended Bridging Scale Method for crack propagation, Proceedings of ECCOMAS, *20^{th} European Congress on Computional Methods in Applied Sciences and Enginering*, University of Vienna, Austria, 10-14 September 2012.

7. Sudhir Sastry YB and **B. Pattabhi Ramaiah**. Studies on Design Bending shear and Vibration Analysis of Thin Walled Structures, *Proceedings of VETOMAC-VI, International Conference on Engineering and Technology of Machinery.* Indian Institute of Technology, Delhi, 13-15 December 2010.

6. Sudhir Sastry YB and **B. Pattabhi Ramaiah**. Estimation of Natural Frequencies of Multi walled carbon Nanotubes Embedded in elastic medium, *Proceedings of VETOMAC-VI, International Conference on Engineering and Technology of Machinery.* Indian Institute of Technology, Delhi, 13-15 December 2010.

5. Sudhir Sastry YB and **B. Pattabhi Ramaiah**. Studies on Acoustic Response of beams with attached point masses, *Proceedings of MSMS, International seminar on Modeling Simulation and Manufacturing Systems*, Andhra University , Visakhapatnam, 29-30 June 2008.

4. **B. Pattabhi Ramaiah**, B. Rammohan, D. Satish Babu, and R. Raghunathan. Sound radiation from a clamped composite rectangular panel under a line constraint, *Proceedings of ICTACEM, 4^{th} International conference on Theoretical Applied Computational and Experimental Mechanics*, IIT Kharagpur, 27-29 December 2007.

3. **B. Pattabhi Ramaiah**, B. Rammohan, S. Vijay Kumar, D. Satish Babu and R. Raghuatnhan. Aero-elastic analysis of stiffened composite wing structure, *Proceedings of VETOMAC IV, International conference on engineering and technology of machinery*, University College of Engineering, Osmania University, Hyderabad, 17-19 December 2007.

2. Sudhir Sastry YB, T.S.S.Narayana and **B. Pattabhi Ramaiah**. Studies on acoustic radiation from clamped rectangular panels with attached point masses, *Proceedings of VETOMAC IV, International conference on engineering and technology of machinery*, University College of Engineering, Osmania University, Hyderabad, 17-19 December 2007.

1. **B. Pattabhi Ramaiah**, B. Rammohan and T.S.S. Narayana. Studies on acoustic radiation from rectangular composite panels, *Proceedings of INCCOM IV, International conference on future trends in composite materials and processing*, IIT Kanpur, 12-15 December 2007.

Technical Reports

4. **PR. Budarapu,** T. Rabczuk. "Atomistic Continuum Multiscale methods for Fracture applications (ACMF)", Project report submitted to HLRS Stuttgart, Germany for utilizing the computational resources, 2010.

3. Bala Ankaiah C., **B. Pattabhi Ramaiah**, Satish Balusu. "Methodology of weld fatigue life estimation for wind turbine components", Project report, RCA team, Wind energy, John.F.Welch Technology Center, GE Bangalore, 2009.

2. **B. Pattabhi Ramaiah**, Bala Ankaiah C., R. Bulli Babu. "Weld fatigue life calculations of 1.5 sl Kaheawa Pastures Generator frame strcture", Project report, RCA team, Wind energy, John.F.Welch Technology Center, GE Bangalore, 2009.

1. Bala Ankaiah C., **B. Pattabhi Ramaiah**, R. Bulli Babu. "Weld fatigue life calculations of 1.5 sl Oklahama Main frame strcture", Project report, RCA team, Wind energy, John.F.Welch Technology Center, GE Bangalore, 2008.

THESES

3. **B. Pattabhi Ramaiah**, "Adaptive multiscale methods for fracture", PhD thesis, Institute of Structural Mechanics, Bauhaus University of Weimar, Germany, 2014.

2. **B. Pattabhi Ramaiah**, "Studies on Acoustic directivity of completely clamped radiating rectangular panel set in a baffle, with attached point masses, theory and experiment", M.E. Thesis, Indian Institute of Science, Bangalore, India, January 2003.

1. **B. Pattabhi Ramaiah**, "Software development for the design and analysis of IC engine crack shaft", B.Tech Thesis, Sri Venkateswara University College of Engineering, Tirupati, India, June 2000.