

Shiva Rudraraju

University of Michigan
Computational Physics Group
Department of Mechanical Engineering
2250 G. G. Brown, 2350 Hayward
Ann Arbor, MI 48109, USA

1035 Island Drive Ct,
Apt #107
Ann Arbor, MI 48105, USA
rudraa AT umich.edu
<http://www-personal.umich.edu/~rudraa/>

RESEARCH INTERESTS ○ Mathematical modeling of coupled physical phenomena in biology and material physics spanning mechanics, transport, thermodynamics and phase transitions.

- Finite Element Method, Isogeometric Analysis, Level Sets.
- Parallel solvers and high performance computing.

EDUCATION ○ University of Michigan, Ann Arbor, USA

· Ph.D. in Mechanical Engineering and Scientific Computing (2008-2011)
“On the theory and numerical simulation of cohesive crack propagation with application to fiber-reinforced composites”

Committee chairs: Prof. Krishna Garikipati and Prof. Anthony M. Waas

· M.S, Aerospace Engineering (2008-2009)

· M.S, Mechanical Engineering (2006-2007)

○ Indian School of Mines (ISM), Dhanbad, India

· B.Tech, Mining Machinery Engineering (2001-2005)

EMPLOYMENT ○ University of Michigan, Ann Arbor, USA

· Postdoctoral Fellow, Computational Physics Group (since May 2011)

· Graduate Research Assistant, Aerospace Engineering (2007-2010)

· Graduate Student Instructor, Mechanical Engineering (Fall 2010)

○ NASA IVHM project intern, Collier Research Corp., Newport News, USA (Summer 2009)

○ Guest scientist, Institute for Mechanics and Fluid Dynamics, Technische Universitat (TU) Freiberg, Germany (Sep 2005-May 2006)

○ DAAD intern, Institute of Safety Research, Helmholtz-Zentrum Dresden-Rossendorf, Dresden, Germany (Summer 2004)

HONOURS & AWARDS ○ *The Jefferson Goblet Award* for the best student paper at the 50th American Institute for Aeronautics and Astronautics - Structures, Dynamics and Materials Conference, Palm Springs, California, USA. (2009)

○ Nominated for the ProQuest Distinguished Dissertation Award (2011) and the Outstanding GSI Award (Fall 2010) in the Department of Mechanical Engineering, University of Michigan.

○ *DAAD Scholarship* for the International Association for Exchange of Students for Technical Experience (IAESTE) exchange programme. (2004)

○ *ISM - Ministry of Human Resource Development (India) Scholarship*. Full tuition fee and living expenses coverage for undergraduate education. (2001-2005)

○ *Ranked 394* out of over 200,000 students in the All India Joint Entrance Screening Examination for admission to the IITs, IT-BHU and ISM. (2001)

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RESEARCH
PROJECTS

- Ongoing
 - *NSF* : Meta-Codes for Computational Kinetics.
 - Multiphysics modeling of in vitro tumor spheroid growth.
 - Dynamic hybrid modeling of breast cancer cell motility.
- Recently completed
 - *NASA IVHM* (Integrated Vehicle Health Management) : Analysis and simulation of crack propagation in laminated fiber reinforced composites. (2008-2010)
 - *Boeing* : Developing displacement discontinuity based multiscale finite element method for predicting damage progression and failure in materials. (2007-2008)

PUBLICATIONS

- *S. Rudraraju, A. Salvi, K. Garikipati, and A. M. Waas*, "In-Plane fracture of laminated fiber reinforced composites with varying fracture resistance: experimental observations and numerical crack propagation simulations," *International Journal of Solids and Structures*, Volume 47, Issues 7-8, April 2010, Pages 901-911.
- *S. Rudraraju, A. Salvi, K. Garikipati, and A. M. Waas*, "Experimental observations and numerical simulations of curved crack propagation in laminated fiber composites," *Composites Science and Technology*, 2011. (article in press)
- *S. Rudraraju, A. Salvi, K. Garikipati, and A. M. Waas*, "Computational Engineering of Mixed-mode, In-plane Crack Propagation in Laminated Fiber Reinforced Composites," *Proceedings of the 52nd AIAA Structures, Structural Dynamics, and Materials Conference*, Denver, Colorado, USA, April 2011.
- *S. Rudraraju, A. Salvi, K. Garikipati, and A. M. Waas*, "Mixed mode in-plane fracture analysis of laminated fiber reinforced composites using the variational multiscale cohesive method," *Proceedings of the 51st AIAA Structures, Structural Dynamics, and Materials Conference*, Orlando, Florida, USA, April 2010.
- *S. Rudraraju, A. Salvi, K. Garikipati, and A. M. Waas*, "In-Plane fracture of laminated fiber reinforced composites with varying fracture resistance," *Proceedings of the 50th AIAA Structures, Structural Dynamics, and Materials Conference*, Palm Springs, California, USA, May 2009.

CONFERENCE
TALKS

- *S. Rudraraju, K. Mills, R. Kemeker and K. Garikipati*, "Multiphysics modeling of in vitro tumor spheroid growth," 48th Annual Technical Conference of Society of Engineering Sciences, Northwestern University (October 2011) and IUTAM Symposium on Computer Models in Biomechanics, Stanford University (August 2011).
- *S. Rudraraju, A. Salvi, K. Garikipati, and A. M. Waas*, "Micromechanics based mixed mode crack propagation in laminated fiber reinforced composites using the variational multiscale cohesive method," 9th World Congress on Computational Mechanics (WCCM), Sydney, Australia, July 2010.
- *S. Rudraraju, P. Prabhakar, K. Garikipati, and A. M. Waas*, "Analytical and numerical modeling of fiber-pullout and bridging zone micromechanics in fiber reinforced composites," 16th US National Congress on Theoretical and Applied Mechanics (USNCTAM), University Park, Pennsylvania, USA, June 2010.
- *S. Rudraraju, A. Salvi, K. Garikipati, and A. M. Waas*, "Mixed mode in-plane fracture analysis of laminated fiber reinforced composites using the variational multiscale cohesive method," *NASA Multiscale Modeling of Composites workshop*, Cleveland, Ohio, July 2009.
- *S. Rudraraju, R. Vignes, A. Salvi, K. Garikipati, and A. M. Waas*, "A multiscale crack path predicting computational method for laminated fiber reinforced composites," 49th AIAA Structures, Structural Dynamics, and Materials Conference, Schaumburg, Illinois, USA, May 2008.