Dr. Gregory J. Rodin
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Dr. Rodin is a Professor of Aerospace Engineering and Engineering Mechanics at The University of Texas at Austin. He joined The University of Texas at Austin in 1986, after completing his Ph.D. degree in Mechanical Engineering at the Massachusetts Institute of Technology. Dr. Rodin is affiliated with the Institute for Computational and Engineering Sciences, Center for Mechanics of Solids Structure and Materials, Texas Materials Institute, and Center for Nano and Molecular Science and Technology.

Dr. Rodin's research is concerned with multi-scale modeling and computational methods applicable to complex solids and fluids. He has published papers in the leading journals in solid mechanics, fluid mechanics, numerical methods, materials science, and arctic engineering. He has delivered more than one hundred invited talks in USA, Australia, Canada, France, Germany, Japan, Netherlands, Switzerland, and United Kingdom. His research has been sponsored by the National Science Foundation, Office of Naval Research, Army Research Office, Department of Energy, Sandia National Laboratories, Texas Advanced Technology Program, ALCOA, Martin Marietta, Nippon Mining Co. (Japan) and Schlumberger R&D.

Dr. Rodin is a U.S. citizen since 1986. He is married to Dr. Altha B. Rodin. They have three children Alexa, David, and Yasha.

EDUCATION

St. Petersburg State Polytechnic University (Russia)	Civil Engineering	B.S.	1980
Massachusetts Institute of Technology	Mechanical Engineering	M.S.	1984
Massachusetts Institute of Technology	Mechanical Engineering	Ph.D.	1986

EMPLOYMENT

Nuclear Power Services, Inc., Engineer, 1980-1981
Research Assistant, Massachusetts Institute of Technology, Department of Mechanical Engineering, 1981-1986
Assistant Professor, The University of Texas at Austin, Department of Aerospace Engineering & Engineering Mechanics, 1986-1992.
Associate Professor with Tenure, The University of Texas at Austin, Department of Aerospace Engineering & Engineering Mechanics, 1992-1999.
Professor with Tenure, The University of Texas at Austin, Department of Aerospace Engineering & Engineering Mechanics, 1999-present.

CONSULTING

Becton, Dickinson and Company, 6/27/1993.
Shell Exploration and Production Company, 07/01/1996 - 08/01/1996.
Shell International Exploration and Production Company, 06/01/2005 - 11/15/2006.
Protomold, Inc. MN 11/01/2006 -- current

HONORS AND AWARDS

NSF Resaerch Initiation Award, 1987
Alcoa Foundation Award, 1991
Alcoa Foundation Award, 1993
Temple Foundation Fellowship, 1995
Visiting Senior Scientist Fellowship from the French National Science Foundation, Ecole Polytechnique, 2002.
Visiting Professorship through the European Union Marie Curie program, Liverpool, UK 2006.

PUBLICATIONS

Refereed Journal Publications

1. Rodin, G.J. and Parks, D.M., "Constitutive Models Of A Power-Law Matrix Containing Aligned Penny-Shaped Cracks," *Mechanics Of Materials*, **5**, 221-228, (1986).
2. Rodin, G.J. and Parks, D.M., "On consistency relations in nonlinear fracture mechanics," *J. Appl. Mech.*, **53**, 834-838, (1986).
3. Rodin, G.J., "An example of crack tip analysis in brittle damaged materials," *Int. J. Fracture*, **33**, R31-R35, (1987).
4. Rodin, G.J. and Parks, D.M., "A self-consistent analysis of creeping damaged solids," *J. Mech. Phys. Solids*, **36**, 237-249, (1988)..
5. Rodin, G.J. and Hwang, Y.-L., "The penny-shaped crack in an infinite body of a power-law material subjected to remote shear," *Eng. Fracture Mech.*, **33**, 611-618, (1989).
6. Rodin, G.J., Hwang, Y.-L., Carrera, R., Mohanti, R. and Ordonez, C.A., "Thermomechanical stress analysis of the vessel coating of an ignition experiment," *Fusion Tech.*, 7, 1745-1749, (1991).
7. Rodin, G.J. and Hwang, Y.-L., "On the problem of linear elasticity for an infinite region containing a finite number of spherical inhomogeneties," *Int. J. Solids Structures*, **27**, 145-160, (1991).
8. Abdel-Tawab, K. and Rodin, G.J., "On the relevance of linear elastic fracture mechanics to ice," *Int. J. Fracture,* **62**, 171-181, (1993).
9. Rodin, G.J., "The overall response of materials containing spherical inhomogeneities," *Int. J. Solids Structures*, **30**, 1849-1863, (1993).
10. Dib, M.W. and Rodin, G.J., "Three-dimensional analysis of creeping polycrystals using arrays of truncated octahedra," *J. Mech. Phys. Solids*, **41**, 725-747, (1993).
11. Dib, M.W. and Rodin, G.J., "Damage Mechanics Of Constrained Intergranular Cavitation," *Acta Metall. Mater.*, **41**, 1567-1575, (1993).
12. Rodin, G.J., "Stress transmission in polycrystals with frictionless grain boundaries," *J. Appl. Mech.*, **62**, 1-6, (1995).
13. Rodin, G.J., "Squeeze film between two spheres in a power-law creeping fluid," *J. Non-Newtonian Fluid Mech* **63**, 141-152, (1996).
14. Rodin, G.J., "Eshelby's inclusions problem for polygons and polyhedra," *J. Mech. Phys. Solids*, **44**, 1977-1995, (1996).
15. Zohdi, T. I., Oden, J. T. and Rodin, G. J., "Hierarchical modeling of heterogeneous bodies," *Comp. Meth. In Appl. Mech. Engrg,* **138**, 273-299, (1996).
16. Abdel-Tawab, K. and Rodin, G.J., "Analysis of primary creep in s2 fresh-water and saline ice ," *Cold Regions Sci. and Tech .* **26**, 83-96, (1997).
17. Fu, Y., Klimkowski, K. J., Rodin, G. J., Berger, E. , Browne, J. C., Singer, J. K. , Van De Geijn, R. A. and Vemaganti, K. S., "A fast solution method for three-dimensional many-particle problems of linear elasticity," *Int. J. Numer. Meth. Engrg .* **42**, 1215-1229, (1998).
18. Rodin, G.J., "Toward rapid evaluation of the elastic interactions among three-dimensional dislocations," *Phil. Mag. Letters* **77**, 187-190, (1998).
19. Rodin, G.J., "Discussion: Elastic fields in a polygon-shaped inclusion with uniform eigenstrains, by N. Nozaki and M. Taya" *J. Appl. Mech.* **65**, 278, (1998).
20. Abdel-Tawab, K. and Rodin, G.J., "Fracture size effects and polycrystalline inhomogeneity," *Int. J. Fracture* **93**, 247-259, (1999).
21. Rodin, G.J., "Continuum damage mechanics and creep life analysis" *J. Appl. Mech*. **67**, 193-196, 2000.
22. Fu, Y. and Rodin, G.J., "A rapid solution method for Stokesian many-particle problems," *Comun. Numer. Meth. Engrg .* **16**, 145-149, (2000).
23. Whitney M. and Rodin, G. J., "Force-velocity relationships for basic bodies moving through power-law fluid," *Int. J. Non-Linear Mech.* **36,** 947-953, (2001).
24. Lai, Y-S, Movchan, A. B. and Rodin, G. J., "A study of three-dimensional cracks*,"Int. J. Fracture* **113**, 1-25, (2002).
25. Makarov D. E. and Rodin G. J., "Configurational entropy and mechanical properties of cross-linked polymer chains with applications to protein and RNA molecules*" Phys. Rev. E* 66(1): Art 011908, (2002)*.*
26. Rodin, G. J. and O. Steinbach, "Boundary element preconditioners for problems defined on slender domains," *SIAM J. Sci. Comp*. **24(4)**: 1450-1464, (2003).
27. Martinsson, P.G., and Rodin, G. J.,"Asymptotic expansions of lattice Green's functions" *Proc. Roy. Soc. London A* **458** (2027), 2609-2622, (2003).

28. Lai, Y-S and Rodin, G. J., "Fast boundary element method for three-dimensional solids containing many cracks*," Engng. Anal. Boundary Element* (invited paper), **27(8)** 845-852, (2003).
29. Eom, K., Li, P.-C., Makarov, D. E., and Roding, G. J., "Relationship between the mechanical properties and topology of cross-linked polymer molecules: Parallel strands maximize the strength of model polymers and protein domains," *J. Phys. Chem. B* 107 (34): 8730-8733 (2003)
30. Rodin, G. J., and Overfelt, J. R., "Periodic conduction problems: Fast multipole method and convergence of integral equations and lattice sums" *Proc. Roy. Soc. London A* **460** 2883-2902 (2004)
31. Babuska I., Podnos E. G. Rodin, G. J., "New fictitious domain methods: Formulation and analysis" *Math. Models Methods in Appl Sci.* 15 1575-1594 (2005).
32. Eom, K. Makarov, D. E. and Rodin, G. J. "Theoretical studies of the kinetics of mechanical unfolding of cross-linked polymer chains and their implications for single molecule pulling experiments" *Phys. Rev*. E 71 (2): Art. No. 021904 Part 1 Feb. (2005).

33. Haq, S., Movchan, A. B. and Rodin, G. J., "Analysis of interphases in lattices", *Acta Mechanica Sinica*, 22 (4), 323 – 330 (2006).
34. Haq, S., Movchan, A. B. and Rodin, G. J., "A numerical method for analyzing defects in lattices", to appear in *J. Appl. Mech.* (2007).
35. Rodin, G. J., "Higher order macroscopic strains and stresses", to appear in *J. Mech. Phys. Solids*

36. Mear, M. E. and Rodin, G. J. "An isolated three-dimensional planar crack: K_I is independent of elastic constants" submitted to *Int. J. Fracture*

37. Wang, Y., Ballarini, R. Rodin, G. J. "Crack-tip parameters in polycrystalline plates with soft grain boundaries" submitted to *ASCE Journal of Engineering Mechanics*.

Refereed Conference Proceedings
1. Dib, M.W. and Rodin, G.J., "Effective Properties Of Creeping Materials Undergoing Grain Boundary Sliding," Advance In Fracture Research, ICF 7, 1835-1842, 1989.
2. Abdel-Tawab, K. and Rodin, G.J., "On The Relevance Of Linear Elastic Fracture Mechanics To Ice," IAHR 92, Proceedings Of The 11th International Symposium On Ice, Vol. 3, 1992.
3. Dib, M.W. and Rodin, G.J., "A Micromechanical Analysis Of A Turbine Rotor," Advance In Local/Fracture Models For The Analysis Of Engineering Problems, ASME Summer Mechanics And Materials Conference, 1-13, 1992.
4. Abdel-Tawab, K. and Rodin, G.J., "An Interpretation Of Results Of The Fracture Toughness Tests On Ice," AMD Vol. 163 Ice Mechanics, ASME Proceedings, 49-59, 1993.
5. Rodin, G.J., "On Composites Densely Filled With Rigid Spheres," AMD Vol. 185 Damage Models For Composites, ASME Proceedings, 107-116, 1994.
6. Abdel-Tawab, K. and Rodin, G.J., "Inelastic Effects In Fracture Of Columnar-Grained Ice," AMD Vol. 207 Ice Mechanics, ASME Proceedings, 49-64, 1995.
7. Overfelt J. R. and Rodin, G. J. "A Method For Direct Simulations of Emulsions in Three Dimensions," in Proceedings of the AIChE Annual Meeting, Reno, NV, 2001.

Books (Authored, Co-Authored, Edited, Co-Edited)
1. Bonnecaze, R. T., and Rodin, G. J., Guest Editor, "Micromechanics of Fluid Suspensions and Solid Composites," a special issue of *Philosophical Transactions* of *the Royal Society, London, 2003*

Book Chapters (Authored, Co-Authored)
1. Fu, Y., Overfelt, J. and Rodin, G.J., "Integral Equations and Fast Summation Methods," in *Mathematical Aspects of Boundary Element Methods*, edited by M. Bonnet, A-M. Saendig and W. L. Wendland, pp. 128-140, 2000, Chapman Hall/CRC Research Notes in Mathematics.
2. Rodin, G.J., "On Fracture of Warm Fresh-Water Ice," in *Scaling Laws in Ice Mechanics and Ice Dynamics*, edited by J. P. Dempsey and H. H. Shen, Kluwer (2001)
3. Martinsson, P. G., and Rodin, G. J., "Boundary Algebraic Equations for Analysis of Lattices" to *Singularities, Asymptotics and Homogenisation in Problems of Mechanics*, edited by A. B. Movchan, Kluwer, 175-182 (2003).

GRANTS AND CONTRACTS
"Microstructural Theory of Creep," National Science Foundation, $60K, 6/87-11/89, ASE/EM.
"Durability Predictions for Adhesively Bonded Joints in Humid Environments," with K. Liechti, Martin Marietta, $45/22K, 2/87-7/89, ASE/EM.
"Analysis of the First Wall System for IGNITEX Experiment," ATP (State of Texas), $900/15K, 9/88-12/90, Center for Fusion Engineering.
"Analysis of Size Effects in Low-Cycle Fatigue," Nippon Mining, $150/5K, 8/90-12/90, ASE/EM.
"Durability Predictions of Adhesively Bonded Joints in Humid Environments," with K. Liechti, $255/127K, 11/90-1/93, ASE/EM.
"Direct Methods for Composite Materials," National Science Foundation, $126K, 9/91-8/94, ASE/EM.
"Constitutive Equations and Fracture Models for Sea Ice," with R. Schapery, $210/105K, 12/91-12/93, ASE/EM.
"Mechanics of Particulate Composites, " Alcoa Foundation, $15K, 5/92-5/95, ASE/EM.
"Constitutive Equations and Fracture Models for Sea Ice," with R. Schapery, Office of Naval Research, $240/120K, 12/93-12/95, ASE/EM.
"Application of High--Performance Numerical Methods to Analysis of Composite Materials," National Science Foundation, $1,200/500K, 3/95-3/98, TICAM.
"Analysis of Diving Anchors," National Science Foundation, $15K, 6/01/97-9/01/98, Offshore Technology Center.
"Unrestricted Research Grant," Schlumberger R&D, $23/11.5K with R. A. van de Geijn, 01/01/97-12/31/97 TICAM.
"Constitutive Equations and Fracture Models for Sea Ice," National Science Foundation, $210/20K with J. P. Dempsey (Clarkson University), 1/09/97-8/31/00, Clarkson University.
Faculty Research Assignment Grant, UT BER, $35K, 09/1/97-01/15/98.
"National Partnership For Advanced Computing Infrastructure," National Science Foundation, 120K for the first year, with J. T. Oden.
"Computational Microstructure for the Aging Analysis of High Explosives," Department of Energy through the Amarillo National Research Consotium, 136K for the first year, with R. A. Schapery and M. F. Wheeler, 1/15/99 – 1/14/00.
"Mathematical Modeling of Hierarchical Lattice Materials," Army Research Office, 89K for the first year, with I. Babuska, 4/1/99 – 3/31/01.
"Structural Simulation Using Multiresolution Material Models," Sandia National Laboratories, 55K per year (my share), with J. T. Oden, I. Babuska and C. Bajaj, 10/1/99 – 9/30/01.
"National Partnership For Advanced Computing Infrastructure," National Science Foundation, 120K (my share), with J. T. Oden - 10/01/01-09/30/02.
"NGS: Collaborative Research : Performance-Driven Adaptive Software Design and Control" National Science Foundation, 80K per year (my share) with J. C. Browne, 10/01/01-09/30/04.
"ITR/AP: A Computational Framework for Reliable Computer Simulations" National Science Foundation, with J. T. Oden $20K (my share), 09/01/02-08/31/06.
"ITR: Simulation of Emulsions" National Science Foundation, 50K per year (my share) with R. Bonnecaze and C. Bajaj, 10/01/03-09/30/05.
"Growth of Three Dimensional Cracks" National Science Foundation, 50K per year (my share) with M. Mear and K. Ravi-Chandra, 10/01/03-09/30/06.

PH.D. SUPERVISIONS COMPLETED:

Dib, M.W.	1991	EM	"A Micromechanical constitutive model for lifetime assessment of creeping polycrystalline structures."
Abdel-Tawab, K.	1995	EM	"Constitutive Modeling and Fracture Analysis of Ice."
Fu, Y.	1998	EM	"Applications of the Fast Multipole Method to Micromechanics of Composite Materials."
Podnos, E. G.	1999	EM	"Applications of Fictitious Domain Method to Micromechanics of Composite Materials."
Lai, Y-S.	2002	EM	"A Study of Three-Dimensional Cracks"
Martinsson, P-G	2002	CAM	"Fast Solution Methods for Lattice Equations" (co-advised with I. Babuska)
Overfelt, J. R	2002	CAM	"Simulation of Three-Dimensional Stokesian Emulsions" (co-advised with R. van de Geijn)
Eom, Kilho	2005	EM	"The Mechanical Behavior of Proteins"

M.S. SUPERVISIONS COMPLETED:

Hwang, Y.-L.	1989	EM	"The Effect of Two Spherical Inhomogeneities on the Stress in an Infinite Elastic Body"
Hacham, Jacob	1992	EM	"Evaluation of Creep Damage."
Thomas, Paul	1992	ASE	"Handbook for Using ABACUS on CRAY-YMP."
Yeh, Hua-Tung	1992	EM	"The Effective Conductivity of Regular Arrays of Spheres."
Podnos, Eugene	1995	EM	"Determination of the Overall Response of Composites Containing Spherical Inhomogeneities"
Klimkowski, Ken	1997	CAM	"Parallel Implementation of Tree Codes"
Whitney, Matt	1997	EM	"Force-Velocity Relationships for Bodies Moving in a Power-Law Fluid"
Hiro, Mae	2000	ASE	"Microstructural Characterization of Glass-Epoxy Composites" (co-advised with K. M. Liechti)
Krivov, Sergei	2001	ASE	"FLEMS: Fast Linear Elastic Many-Particle Solver"
Deng, Guosheng	2002	Manuf.	"Component Optimization of a FMM Code" (co-advised with J. C. Browne)
Eom, Kilho	2003	EM	"Modeling of Lattice Materials"
Ploor, Derek R.	2005	CAM	"Computing of Mean Curvature on Quadrilateral Meshes"

OTHER RESEARCH SUPERVISION

Cango, M. post-doctoral fellow
Elster, A. post-doctoral fellow
Liu, Y., visiting scientist
Nikolov, S. exchange PhD student
Singer, J. K. post-doctoral fellow
Skvortsov, V. R., visiting scientist
Fu, Y, post-doctoral fellow
Podnos, E. G., post-doctoral fellow
Guosheng Deng, RA, Computer Sciences
Aymeric Voissin, Ecole Polytechnique, 2-month internship