Gregory Rodin
Professor, Aerospace Engineering and Engineering Mechanics

ENDOWED POSITION: **Temple Foundation Endowed Faculty Fellowship No. 6**

EDUCATION:

St. Petersburg Tech. State Univ. (Russia)	Engineering	BS	1980
Massachusetts Institute of Technology	Mechanical Engineering	MS	1984
Massachusetts Institute of Technology	Mechanical Engineering	Ph.D.	1986

CURRENT AND PREVIOUS ACADEMIC POSITIONS:

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.

OTHER PROFESSIONAL EXPERIENCE:

Nuclear Power Services, Inc., Engineer, 1980-1981.

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, 11/01/2006 – 08/31/2007
Chevron, 01/01/2014-08/31/2014

MEMBERSHIPS IN PROFESSIONAL AND HONORARY SOCIETIES:

Member, American Society for Engineering Science, 1988-2000
Member, Society for Industrial and Applied Mathematics, 1996-2002
Member, US Association for Computational Mechanics, 1996-current
Member, American Rock Mechanics Association, 2012

PROFESSIONAL SOCIETY AND MAJOR GOVERNMENTAL COMMITTEES, EDITORIAL BOARDS, AND CONFERENCES ORGANIZED/CHAIRED:

Sections Organized:

SES conference, jointly organized 2 sections, San-Diego, CA 1992.
SES conference, jointly organized 2 sections, College Station, 1994.
2nd SIAM Materials Conference, jointly organized 2 sections, Philadelphia, PA, 1997.
ASME/SES/ASCE joint conference, McNU'97, jointly organized 4 sections, Evanston, IL 1997.
13th US Congress of Applied Mechanics, organized 2 sections, Gainseville, FL 1997.
SES conference, organized 12 sections, Austin, TX 1999.
8th USACM Congress, organized 5 sections, Austin, TX 2005.

Conferences Organized:

SES conference in 2000, jointly with M. E. Mear.

IUTAM Symposium Micromechanics of Fluid Suspensions and Solid Composites, jointly with Roger Bonnecaze (ChE, UT) and Zvi Hashin (Tel-Aviv), 2001

Journal Editorships & Editorial Boards

Associate Editor, *ASCE Journal of Engineering Mechanics* 2001-2003

UNIVERSITY COMMITTEES/ADMINISTRATIVE ASSIGNMENTS:

University Committees

Chair, CAM Expansion Committee 2001
Member, Program in Computational and Applied Mathematics, 1993-present.
Member, Program in Materials Science and Engineering, 1988-present.
Member, Graduate Studies Subcommittee, Program in Computational and Applied Mathematics, 1999-2004
Chair, CAM Admission Committee 2005
Member, CAM Expansion Committee 2008
Chair, CAM Admission Committee 2011

College Committees

Member, Graduate Student Issues Committee, 1996-1998
Member, Technical Communications Committee, 2000-present

Department Committees

Member, Mathematics Qualifying Exams Committee, 1989-1992
Member, Solid Mechanics Qualifying Exams Committee,1987-2000
Chairman, Graduate Student Life Committee, 1994-1995
Member, Dynamics Qualifying Exams Committee, 2001-2002
Member, Dr. Akella's Promotion Committee, 2004
Member, Dynamics Qualifying Exam Committee, 2003-04
Member, Undergraduate Student Surveying Committee, 2003-04
Member, Recruitment for the Solid Mechanics Area Committee, 2003-06
Member, Committee for Undergraduate Mechanics Classes, 2003-current
Member, Curriculum Development Committee, 2008

HONORS AND AWARDS:

NSF Research 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 European Union Marie Curie program, Liverpool, UK 2006.
Visiting Professorship at Ecole Normale Superior, June 2008.
Visiting Senior Scientist Fellowship, Ecole Polytechnique, July 2008.
Grand Challenge Faculty Fellowship from W. A. Tex Moncrief, Jr. Endowment in Simulation-Based Engineering Sciences.

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. *Journal of Applied Mechanics* **53**, 834-838 (1986).

3. Rodin, G.J., An example of crack tip analysis in brittle damaged materials. *International Journal of Fracture* **33**, R31-R35 (1987).
4. Rodin, G.J. and Parks, D.M., A self-consistent analysis of creeping damaged solids. *Journal of the Mechanics and Physics of 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. *Engineering Fracture Mechanics* **33**, 611-618 (1989).
6. Rodin, G.J., Hwang, Y.-L., Carrera, R., Mohanti, R. and Ordonez, C.A., Thermo-mechanical stress analysis of the vessel coating of an ignition experiment. *Fusion Technology* **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 inhomogeneities. *International Journal of Solids and Structures* **27**, 145-160 (1991).
8. Abdel-Tawab, K. and Rodin, G.J., On the relevance of linear elastic fracture mechanics to ice, *International Journal of Fracture* **62**, 171-181 (1993).
9. Rodin, G.J., The overall response of materials containing spherical inhomogeneities. *International Journal of Solids and Structures* **30**, 1849-1863 (1993).
10. Dib, M.W. and Rodin, G.J., Three-dimensional analysis of creeping polycrystals using arrays of truncated octahedral. *Journal of the Mechanics and Physics of Solids* **41**, 725-747 (1993).
11. Dib, M.W. and Rodin, G.J., Damage mechanics of constrained intergranular cavitation. *Acta Metallurgica Materialia* **41**, 1567-1575 (1993).
12. Rodin, G.J., Stress transmission in polycrystals with frictionless grain boundaries. *Journal of Applied Mechanics* **62**, 1-6 (1995).
13. Rodin, G.J., Squeeze film between two spheres in a power-law creeping fluid. *Journal of Non-Newtonian Fluid Mechanics* **63**, 141-152 (1996).
14. Rodin, G.J., Eshelby's inclusions problem for polygons and polyhedral. *Journal of the Mechanics and Physics of Solids* **44**, 1977-1995 (1996).
15. Zohdi, T. I., Oden, J. T. and Rodin, G. J., Hierarchical modeling of heterogeneous bodies. *Computer Methods in Applied Mechanics and Engineering* **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 Science and Technology* **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. *International Journal of Numerical Methods in Engineering* **42**, 1215-1229 (1998).
18. Rodin, G.J., Toward rapid evaluation of the elastic interactions among three-dimensional dislocations. *Philosophical Magazine 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 *Journal of Applied Mechanics* **65**, 278 (1998).
20. Abdel-Tawab, K. and Rodin, G.J., Fracture size effects and polycrystalline inhomogeneity. *International Journal of Fracture* **93**, 247-259 (1999).
21. Rodin, G.J., Continuum damage mechanics and creep life analysis *Journal of Applied Mechanics* **67**, 193-196 (2000).
22. Fu, Y. and Rodin, G.J., A rapid solution method for stokesian many-particle problems, *Communications* in *Numerical Methods in Engineering* **16**, 145-149 (2000).
23. Whitney M. and Rodin, G. J., Force-velocity relationships for basic bodies moving through power-law fluid. *International Journal of Non-Linear Mechanics* **36,** 947-953 (2001).
24. Lai, Y-S, Movchan, A. B. and Rodin, G. J., A study of three-dimensional cracks. *International Journal of 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. *Physical Review E* 66(1): Art 011908, (2002).
26. Rodin, G. J. and O. Steinbach, Boundary element preconditioners for problems defined on slender domains. *SIAM Journal of Scientific Comp*uting **24(4)**: 1450-1464 (2003).
27. Martinsson, P.G., and Rodin, G. J., Asymptotic expansions of lattice Green's functions. *Proceedings of the Royal Society, 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., *Engineering Analysis with Boundary Element* Methods (invited paper) **27,** 845-852 (2003).
29. Eom, K., Li, P.-C., Makarov, D. E., and Rodin, 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. *Journal of Physical Chemistry 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. *Proceedings of the Royal Society, 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 Appled Sci*ences **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. *Physical Review* 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. *Journal of Applied Mechanics* **74,** 686-690 (2007).
35. Rodin, G. J., Higher order macroscopic strains and stresses, *Journal of the Mechanics and Physics of Solids* **55,** 1103-1119 (2007).
36. Wang, Y., Ballarini, R. Rodin, G. J. Crack-tip parameters in polycrystalline plates with soft grain boundaries. *ASCE Journal of Engineering Mechanics* **134**, 100-109 (2008).
37. Soheilifard, R., Makarov D. E. and Rodin, G. J. Critical evaluation of network models for the dynamics of proteins in crystals. *Physical Biology* **5** (2) Article Number: 026008 (2008).
38. Martinsson, P.G., and Rodin, G. J., Boundary algebraic equations. *Proceedings of the Royal Society, London A* **465.** 2489-2503 (2009)
39. Shestopalov, N. V., Henkelman, G., Powell, C. T., Rodin, G. J. Optimal control of electrostatic self-assembly of binary monolayers *New Journal of Physics* **11** Article Number: 053014 Published: MAY 27 2009.
40. Shestopalov, N. V., Henkelman, G., Rodin, G. J. Guided self-assembly of electrostatic binary monolayers via isothermal-isobaric control . *Journal of Chemical Physics* **135** 154501 (2011)
41. Zhao, H., Makarov, D. E. and Rodin, G. J. The resistance curve for subcritical cracks near the threshold. *International Journal of Fracture* **167**(2), 147-155 (2011).
42. Mear, M. E. and Rodin, G. J. An isolated three-dimensional planar crack: the stress intensity factor is independent of elastic constants. *International Journal of Fracture* **172**, 217-218 (2011).
43. Soheilifard, R., Makarov D. E. and Rodin, G. J. Rigorous coarse-graining for the dynamics of linear systems with applications to relaxation dynamics in proteins. *Journal of Chemical Physics* (2011) Number: 026008
44. Of, G., Rodin, G.J., Steinbach, O., Taus, M., Coupling of Discontinuous Galerkin Finite Element and Boundary Element Methods, *SIAM Journal on Scientific Computing* 34 (3), 1659-1677 (2012).
45. Rodin, G. J. and Weng, G.J., On reflected interactions in elastic solids containing inhomogeneity, *Journal of the Mechanics and Physics of Solids* **68**, 197–209 (2014).
46. Carleton, J.B., D'Amore, A. Feaver, K.R., Rodin, G.J. and Sacks, M. Geometric characterization and simulation of planar layered elastomeric fibrous biomaterials, to appear in *Acta Biomaterialia* (2014).

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.
8. Choi, J.-W. Duncan, I. J., Rodin, G. J., Microcrack nucleation in porous solids under predominantly compressive stress states with applications to shale gas mudrocks, in proceedings of 46th Annual meeting of

American Rock Mechanics Association, Chicago, IL, 2012.

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).

Technical Reports

1. Abdel-Tawab, K. and Rodin, G.J., Fracture Size Effects and Polycrystalline Inhomogeneity, 1997, CMSSM Report.
2. 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, TICAM Report.
3. Rodin, G.J. and Mear, M. E., Toward rapid evaluation of the elastic interactions among three-dimensional dislocations, CMSSM Report.
4. Rodin, G. J. and O. Steinbach, Boundary Element Preconditioners for Problems Defined on Slender Domains, University of Stuttgart, 2000/10.

ORAL PRESENTATIONS:

1. Constitutive Equations for Creeping Damaged Solids, ME Seminar Series, MIT Cambridge, MA 1986.
2. Constitutive Equations for Creeping Damaged Solids, ASE/EM Seminar Series, UT Austin, Austin, TX 1986.
3. Constitutive Equations for Creeping Damaged Solids, Micromechanics of Metals and Polymers, Workshop Sponsored by ARO at Cornell University, Ithaca, NY 1986.
4. Constitutive Equations for Creeping Damaged Solids,MSE Seminar Series, UT Austin, Austin, TX 1987.
5. Constitutive Equations for Creeping Damaged Solids, Southwest Research Institute, San Antonio, TX 1987.
6. The Elastic Interactions Among Spherical Inhomogeneities, ME Seminar Series, MIT Cambridge, MA 1988.
7. Analysis of the Periodic Array of Truncated Octahedra, International Conference on Fracture 7, Houston, TX, 1989.
8. The Elastic Interactions Among Spherical Inhomogeneities, ONR Workshop on Micromechanics of Solid Propellants, Edwards AFB, Invited speaker, 1989.
9. The Elastic Interactions Among Spherical Inhomogeneities, Texas Fracture Group Meeting, San Antonio, TX, 1989.
10. The Elastic Interactions Among Spherical Inhomogeneities, Society for Natural Philosophy Meeting, Lincoln, NE, 1990.
11. The Elastic Interactions Among Spherical Inhomogeneities, 16th U.S. Congress of Theoretical and Applied Mechanics, Tempe, AZ, 1990.
12. Three-Dimensional Modelling of Creep Damage, Texas Fracture Group Meeting, Houston, TX, 1990.
13. The Elastic Interactions Among Spherical Inhomogeneities, ASE/EM Seminar Series, UT Austin, Austin, TX 1991
14. Three-Dimensional Modelling of Creep Damage, Materials Science Lecture Series Seminar, Rice University, Houston, TX, 1991.
15. Three-Dimensional Modelling of Creep Damage, 21st ASTM Fracture Meeting, College Station, TX, 1991.
16. The Elastic Interactions Among Spherical Inhomogeneities, Society for Engineering Science Meeting, Gainesville, FL, 1991.
17. Three-Dimensional Modelling of Creep Damage, Society for Engineering Science Meeting, Gainesville, FL, 1991.
18. On the Relevance of Linear Elastic Fracture Mechanics to Ice, Society for Engineering Science Meeting, San Diego, CA, 1992.

19. Lattice Sums for Materials Containing Spherical Inhomogeneities, Society for Engineering Science Meeting, San Diego, CA, 1992.
20. An Interpretation of Results of the Fracture Toughness Tests on Ice, Texas Fracture Group, College Station, TX, 1993.
21. An Interpretation of Results of the Fracture Toughness Tests on Ice, Joint ASME/SES/ASCE Meeting, Charlottesville, VA, 1993.
22. Stress Transmission in Polycrystals with Frictionless Grain Boundaries, Plasticity 93, Baltimore, MD, 1993.
23. Stress Transmission in Polycrystals with Frictionless Grain Boundaries, Joint ASME/SES/ASCE Meeting, Charlottesville, VA, 1993.
24. Interpretation of Fracture Toughness Tests on Brittle Polycrystals, MRS Meeting, 1994.
25. Interpretation of Fracture Toughness Tests on Brittle Polycrystals, USTAM Congress, Seattle, WA, 1994.
26. On Elastic Interactions Among Spherical Inhomogeneties, USTAM Congress, Seattle, WA, 1994.
27. On Elastic Interactions Among Spherical Inhomogeneties, SES Meeting, College Station, 1994.
28. Squeeze Film between Two Rigid Spheres, SES Meeting, College Station, 1994.
29. On Composites Densely Filled with Rigid Spheres, Winter ASME Meeting, Chicago, IL, 1994.
30. Elastic Interactions in Composites ASE Seminar, TA&M University, 1995.
31. Inelastic Effects in Fracture of Columnar-Grained Ice, LLNL, CA, 1995.
32. Inelastic Effects in Fracture of Columnar-Grained Ice, Summer ASME Meeting, UCLA, 1995.
33. On Eshelby's Inclusion Problem for Polygons and Polyhedra, Summer ASME Meeting, UCLA, 1995.
34. Application of High--Performance Numerical Methods to Analysis of Composite Materials, Winter ASME Meeting, San-Francisco, 1995.
35. Application of High--Performance Numerical Methods to Analysis of Composite Materials, NSF HPCC Workshop, 1996.
36. Application of the Fast Multipole Method to Analysis of Composite Materials, ICTAM, Kyotto, Japan, 1996.
37. Fracture Size Effects and Polycrystalline Inhomogeneity, Society for Engineering Science Meeting, Tempe, AZ, 1996.
38. Fracture Size Effects and Polycrystalline Inhomogeneity, Solid Mechanics Seminar, UT Austin 1997.
39. Application of the Fast Multipole Method to Analysis of Composite Materials, TICAM Seminar, UT Austin 1997.
40. Application of the Fast Multipole Method to Analysis of Composite Materials, SIAM Materials Conference, Philadelphia, PA1997.
41. Fracture Size Effects and Polycrystalline Inhomogeneity, SIAM Materials Conference, Philadelphia, PA1997.
42. Application of the Fast Multipole Method to Analysis of Composite Materials, McNU'97, Evanston, IL 1997.
43. Application of the Fictitous Domain Method to Analysis of Composite Materials, McNU'97, Evanston, IL 1997.
44. Application of the Fictitous Domain Method to Analysis of Composite Materials, 10th Domain Decomposition Conference, Boulder, CO 1997.
45. Application of the Fast Multipole Method to Analysis of Composite Materials, 10th Domain Decomposition Conference, Boulder, CO 1997.
46. Advances in Analysis of Large-Scale Micromechanics Problems, IV USNational Congress on Computational Mechanics, San-Francisco, CA 1997.
47. Application of the Fast Multipole Method to Micromechanics, MIT, Cambridge, MA 1997.
48. Application of the Fast Multipole Method to Micromechanics, Multiscale Material Modelling Workshop, Cambridge, MA 1997.
49. Application of the Fast Multipole Method to Micromechanics, Mathematics Institute, Stuttgart, Germany 1997.
50. Application of the Fast Multipole Method to Micromechanics, Mechanics Institute, Stuttgart, Germany 1997.
51. Application of the Fast Multipole Method to Micromechanics, Mechanics Institute, Darmstadt, Germany 1997.
52. Application of the Fast Multipole Method to Micromechanics, Technical University of Delft, The Netherlands 1997.
53. Application of the Fast Multipole Method to Micromechanics, University of Lousanne, Switzerland 1997.
54. Application of the Fast Multipole Method to Micromechanics, Dept. of Mathematics, University of Utah 1997.
55. Application of the Fast Multipole Method to Micromechanics, LLNL, CA 1997.
56. Rapid Solition of Dislocation Dynamics Problems, Hardening and Dislocation Patterning Workshop, LLNL, CA 1998.
57. Rapid Solution of Micromechanics Problems, 13th US Congress of TAM, Gainsville, FA, 1998.
58. Continuum Damage Mechanics and Creep Life Analysis, 13th US Congress of TAM, Gainsville, FA, 1998.
59. Rapid Solution of Micromechanics Problems, Schlemberger Research Labs, Ridgefield, CT, 1998.

60. Fracture Size Effects, IAHR'98, Potsdam, NY 1998.
61. Primary Creep of S2 Ice, IAHR'98, Potsdam, NY 1998.
62. Microstructural Characterization of Heterogeneous Materials, LANL, NM, 1998.
63. Microstructural Characterization of Heterogeneous Materials, University of Stuttgart, Germany, 1999.
64. Microstructural Characterization of Heterogeneous Materials, University of Hanover, Germany, 1999.
65. Microstructural Characterization of Heterogeneous Materials, University of Liverpool, England, 1999.
66. Microstructural Characterization of Heterogeneous Materials, University of Cambridge, England, 1999.
67. Microstructural Characterization of Heterogeneous Materials, ETH Zurich, Switzerland, 1999.
68. Microstructural Characterization of Heterogeneous Materials Based on Computed Tomography, 6th USACM Conference, Boulder, 1999.
69. Fast Boundary Element Methods, 6th USACM Conference, Boulder, 1999.
70. Rapid Solution of Large Micromechanical Problems, 6th USACM Conference, Boulder, 1999.
71. Microstructural Characterization of High Explosives, ANRC Meeting, Amarillo, TX, 1999
72. Creep Deformation of Solids Containing Intergranular Liquid Phase, TMS Annual Meeting, San-Diego, CA, 1999.
73. Integral Equations and Fast Summation Methods, SIAM Conference on High-Performance Computing, San-Antonio, TX, 1999.
74. Integral Equations and Fast Summation Methods, German-Australian workshop on Integral Equations, Sydney, 2000.
75. Integral Equations and Fast Summation Methods, Dept. of Mathematics, Southern Methodist Univeristy, 2000.
76. Integral Equations and Fast Summation Methods, Dept. of Mathematics, University of Stuttgart, 2000.
77. Domain Decomposition Method for Heterogeneous Solids, Dept. of Mathematics, Pennsylvania State University, 2000.
78. Microstructural Characterization of Heterogeneous Materials, Society for Engineering Science Conference, Austin, TX, 2000.
79. Microstructural Characterization of Heterogeneous Materials, Sandia National Laboratories, 2000.
80. Periodic Boundary Conditions and Fast Boundary Element Methods, Society for Engineering Science Conference, Austin, TX, 2000.
81. Mathematical Analysis of Lattice Materials, Society for Engineering Science Conference, Austin, TX, 2000.
82. Periodic Boundary Conditions and Fast Boundary Element Methods, Numerical Methods in Fluids Conference, Austin, TX, 2000.
83. Hierarchical Modeling of Heterogeneous Materials, International Congress of Theoretical and Applied Mechanics Union, Chicago, 2000.
84. Hierarchical Homogenization, TICAM Seminar, 2000.
85. Fast Boundary Element Methods Civil Engineering Seminar, UT, 2001.
86. Fast Boundary Element Methods Aerospace and Mechanical Engineering, UC, San-Diego, 2001.
87. Hierarchical Homogenization, Keynote Lecture, 6th US Congress of Computational Mechanics, Dearborn, MI, 2001.
88. Fast Boundary Element Methods Keynote Lecture, 6th US Congress of Computational Mechanics, Dearborn, MI, 2001.
89. Error Analysis for Methods with Non-Matching Grids 6th US Congress of Computational Mechanics, Dearborn, MI, 2001.
90. Analysis of Three-Dimensional Cracks *ASME* Winter Annual Meeting, New York (2001).
91. A Method for Direct Simulations of Emulsions in Three Dimensions AIChE Annual Meeting, Reno, NV, 2001.
92. A Method for Direct Simulations of Emulsions in Three Dimensions Invited Seminar, ME, UC Berkeley, 2002.
93. Hierarchical Methods Laboratory for Solid Mechanics, Ecole Polytechnique, 2002.
94. Lattice Green's and Boundary Algebraic Equations US Congress of Theoretical and Applied Mechanics, Blacksburg, VA, 2002.
95. Lattice Green's and Boundary Algebraic Equations IUTAM Symposium on *Singularities, Asymptotics and Homogenisation in Problems of Mechanics, Liverpool UK (2002)*
96. A Method for Direct Simulations of Emulsions in Three Dimensions US Congress of Theoretical and Applied Mechanics, Blacksburg, VA, 2002.
97. Hierarchical Homogenization Dept. of Mathematics, University of Stuttgart, 2003.
98. Hierarchical Homogenization Ile de France Lecture, Ecole Polytechnique, France 2003.

99. Renormalization of Lattice Sums and Fast Multipole Method Dept. of Mathematics, University of Liverpool, 2003.
100. Renormalization of Lattice Sums and Fast Multipole Method Hydrodynamics Laboratory, Ecole Polytechnique, France 2003.
101. A Method for Direct Simulations of Emulsions in Three Dimensions workshop on New Trends in Boundary Elements, Oberwolfach, 2002.
102. Hierarchical Methods Dept. of Mathematics, Univ. of Saarbrucken, Germany 2002.
103. Hierarchical Modeling of Heterogeneous Fluids and Solids – Mechanical Engineering Seminar at Caltech, March, 2004
104. Applications of FMM to Modeling of Heterogeneous Fluids and Solids – Workshop on FMM, April, 2004
105. Boundary Algebraic Equations presented at the conference on Advances in Boundary Element Methods, May 2004
106. Hierarchical Modeling of Heterogeneous Fluids and Solids – Department of Mathematics, Colorado School of Mines, Nov., 2004
107. Hierarchical Modeling of Heterogeneous Fluids and Solids – Mechanical Engineering Seminar Texas A&M University, Feb., 2005
108. Modeling of 3-D cracks Shell International, The Hague, Mar. 2005.
109. Mechanics of Strong Proteins Ecole Polytechnique, France, Mar. 2005.
110. Modeling of Protein Molecules Solid structures and materials seminar, The University of Texas at Austin
111. On Convergence of Lattice Sums and Fast Multipole Method ICES seminar, December, 2004.
112. Periodic Conduction Problems and Fast Multipole Method invited lecture 8th USACM Congress, July, 2005.
113. Models and numerical methods for lattice structures, Applied Mathematics Seminar, University of Liverpool, May 2006.
114. Generalized Hill-Mandel's conditions, Applied Mathematics Seminar, University of Liverpool, June 2006.
115. Generalized Hill-Mandel's conditions, Applied Mechanics Seminar, Ecole Polytechnique, June 2006.
116. Models and numerical methods for lattice structures, Keynote lecture, 14th Congress of Theoretical and Applied Mechanics, Boulder CO, July 2006.
117. Generalized Hill-Mandel's conditions, Invited lecture, 14th Congress of Theoretical and Applied Mechanics, Boulder CO, July 2006.
118. Mechanical modeling of proteins, Contributed lecture, 14th Congress of Theoretical and Applied Mechanics, Boulder CO, July 2006.
119. Mechanical modeling of proteins, Invited lecture, University of Houston, Aug. 2006.
120. Hierarchical Representations and Models Invited Lecture, University of Minnesota, Oct. 2006.
121. On Seamless Matching of Discrete and Continuum Models McMat 2007, ASME Applied Mechanics and Materials Conference, Austin, TX, June 3-7, 2007
122. On Threshold Behavior of Sub-Critical Cracks McMat 2007, ASME Applied Mechanics and Materials Conference, Austin, TX, June 3-7, 2007
123. G. J. Rodin Matching of discrete and continuum models University of Liverpool, May 2008
124. G. J. Rodin Matching of discrete and continuum models Ecole Polytechnique, June 2008
125. G. J. Rodin Matching of discrete and continuum models Russian Academy of Sciences, June 2008
126. G.J. Rodin, Threshold for sub-critical crack growth Ecole Normale Superior, Department of Earth, Oceans, and Atmosphere. July, 2008
127. G. J. Rodin On modeling of ablating layers AFOSR workshop on Thermal Protection Systems, April 2009, Santa-Fe, NM.
128. G.J. Rodin, On the absence of the Saint-Venant effect in lattice structures Ecole Polytechnique, June 2009
129. G. J. Rodin On BEM/FEM Coupling for Geo-Mechanics Problems, Center for Subsurface Modeling Affiliates Meeting, UT Austin, October 2009.
130. G. J. Rodin Controlled Self-Assembly of Charged Particle Monolayers, invited seminar at Texas Christian University, May 2010.
131. G. J. Rodin On Matching Discrete and Continuum Models IVth European Conference on Computational Mechanics, Paris, May 2010.
132. G. J. Rodin Controlled Self-Assembly of Charged Particle Monolayers, 16th US National Congress of Theoretical and Applied Mechanics, Penn State, June 2010.
133. G. J. Rodin The R-Curve Near the Threshold for Subcritical Crack Growth, 16th US National Congress of Theoretical and Applied Mechanics, Penn State, June 2010 (section plenary lecture).
134. G. J. Rodin The Geometry and Physics of Fiber-Form, NASA Ames invited lecture, April 2011.

135. G. J. Rodin The Geometry and Physics of Fiber-Form, ASME Summer Annual Meeting, Chicago, IL, June 2011.
136. G. J. Rodin Continuum Approximation of Discrete Problems, 11th USCCM, Minneapolis, MN, August 2011.
137. G. J. Rodin Isogeometric Boundary Element Methods, NSF workshop on Advances in Boundary Element Methods, Minneapolis, MN, March 2012.
138. G. J. Rodin Microcrack nucleation in porous solids under predominantly compressive stress states with applications to shale gas mudrocks, 46th Annual meeting of American Rock Mechanics Association, Chicago, IL, 2012.
139. Rodin, G.J. Simulations of two-dimensional fibrous networks: algorithm and basic scaling relationships, 13th PACAM Congress, Houston, TX, 2013
140. Rodin, G.J., On non-interacting inhomogeneities, 50th Society for Engineering Science meeting, Providence, RI., 2013
141. Rodin, G.J. , On resistance curve for sub-critical crack growth, 50th Society for Engineering Science meeting, Providence, RI., 2013.
142. Rodin, G. J., On reflected interactions in elastic solids containing inhomogeneity, Invited Seminar at University of Illinois at Urbana-Champaign, 2013.
143. Rodin, G. J., On reflected interactions in elastic solids containing inhomogeneity, Continuum Modeling of Discrete Systems XIII, Salt Lake City, UT, 2014.
144. Rodin, G. J., Chemo-mechanics of silicon lithiation, School for Theoretical Chemistry, Telluride, CO, 2014.

Review Activities

National Science Foundation
Army Research Office
Air Force Research Office
National Research Council
ASCE Journal of Cold Regions Engineering
Acta Mechanica
Communications in Applied Mathematics
Communications in Numerical Methods in Engineering
Journal of Elasticity
Journal of Engineering Materials
Journal of Fluid Mechanics
Journal of Geophysial Research
Mathematics and Mechanics of Solids
Mechanics of Materials
Computer Methods in Applied Mechanics and Engineering
International Journal of Engineering Science
Journal of Applied Mechanics
Philosophical Magazine
International Journal of Numerical Methods in Engineering
International Journal of Fracture
International Journal of Solids and Structures
Proceedings of the Royal Society
Journal of the Mechanics and Physics of Solids
Computational Mechanics
Philosophical Transactions of the Royal Society
Journal of Chemical Engineering
Mechanics Research Communications

RESEARCH TOPICS

Modeling and Simulation of Engineered Biological Tissues
Modeling and Simulation of Underground Fractures

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.
Modeling of fracture, penetration, and fragmentation of brittle solids Institute for Advanced Technology, 20K per year 09/01/08-08/31/09
Predictive Science Application Alliance Program (*PSAAP*) Department of Energy, 70K per year (my share), 04/01/08-03/31/13 with multiple co-PIs, R. Moser PI.
Computational Nano-manufacturing UT Chancellor's Office, 48K (my share) 08/01/08-07/30/12 with R. T. Bonnecaze and S. Srinivasan.
Multiscale Modeling of Solids DOE, my share 36K 09/01/09-08/31/11 with J.T. Oden.
Grand Challenge Faculty Fellowship from W. A. Tex Moncrief, Jr. Endowment in Simulation-Based Engineering Sciences, $75,000, 01/01-2011-09/01/2011.
Analysis of a new generation of anodes, through a DOE ERFC at UT, 09/12-07/14 with P. Rossky.
Course Transformation: Statics EM306. Provost's office, 06/13-08/14.

CONTINUING EDUCATION:

Shortcourse, taught, Fundamentals and Applications of Mechanics of Fracture, The University of Texas at Austin, Summers 1991.

Shortcourse, taught, Fundamentals and Applications of Mechanics of Fracture, The University of Texas at Austin, Summers 1992.
Shortcourse, taught, Fundamentals and Applications of Mechanics of Fracture, 3M Austin, Fall 1997.
Review course, taught, Mechanics of Materials for PE License Exam, Austin, Fall 1997.
Review course, taught, Mechanics of Materials for PE License Exam, Austin, Fall 1998.
Review course, taught, Mechanics of Materials for PE License Exam, Austin, Fall 1999.
Short course on Introduction to Integral Equation and Multipole Methods at International School of Mechanics at Udine, Italy, 2002.
Workshop on Fast Multipole Methods, by invitation. Univ. of Maryland, April 2004.
Short course on Introduction to Fast Numerical Methods for Integral Equations at International School of Mechanics at Udine, Italy, 2008.
Workshop on Thermal Protection Systems, Monterey, CA, April 2008.

ADDITIONAL TEACHING ACTIVITIES:

Honors Colloquium, Seventeenth Century Mechanics and Twenty First Century Computing, Summer 1997.
Four guest lectures in CAM Mathematical Modeling course.

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
Shestopalov N.V.	2010	CAM	Controlled Self-Assembly of Charged Particle Monolayers, (co-advised with G. Henckelman)
Zhao H.-F.	2010	CAM	Modeling and computing based on lattices
Sohelifard, Reza	2011	EM	Modeling of protein structures

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
Dawson, A. M.	2008	CAM	Verification and Validation of CTH and EMU for Hypervelocity Impact into Concrete

PH.D. IN PROGRESS:	**DEGREE EXPECTED**
James Carleton	2013
Matthia Taus	2014
Vikram Bhamidipati	2014

M.S. IN PROGRESS:	**DEGREE EXPECTED**

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
Drach, A., post-doctoral fellow
Dong, C.Y., visiting scientist

Gregory J. Rodin, Professor
The University of Texas at Austin
Department of Aerospace Engineering
and Engineering Mechanics

G.J. Rodin is Professor in the Aerospace Engineering and Engineering Mechanics Department at The University of Texas at Austin, where he has been teaching since 1986. He earned his Ph.D. in Mechanical Engineering at the Massachusetts Institute of Technology in 1986. He is also a member of the Institute for Computational and Engineering Sciences, Texas Materials Institute, and Institute for Theoretical Chemistry. He was awarded Research Initiation Grant by the National Science Foundation in 1987, ALCOA Foundation Awards in 1991 and 1993, and was chosen as a Temple Foundation Fellow in 1995. He held visiting positions in France at Ecole Normale Superior (Department of Earth, Atmosphere, and Oceans) and Ecole Polytechnique (Laboratory of Solid Mechanics) and United Kingdom at University of Liverpool (Applied Mathematics).

Dr. Rodin is committed to the highest standards of undergraduate education and regularly teaches large sections of the undergraduate Statics (EM 306) and Mechanics of Solids (EM 319) courses. Also he has been involved in teaching five graduate courses, two of which were new courses that he introduced.

Dr. Rodin's primary research interests are in micromechanical modeling and simulation of heterogeneous materials, and he is also interested in various aspects of applied mathematics and fluid mechanics. He has published papers in the leading journals in numerical methods, solid mechanics, fluid mechanics, materials science, and arctic engineering. He has delivered about one hundred and fifty 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 co-founder of Computational Fracture Mechanics Associates LLC, which provides consulting services in the area of design and simulation of hydraulic fracturing processes.