

# Curriculum Vitae

## I-Shih Liu

### A. Institution

Address: Instituto de Matemática  
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### B. Personal

Status: Married, one son

Home address: Rua Cambaúba, 985 Apt. 303  
Rio de Janeiro, RJ 21940-005, Brasil

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### C. Education

- **Graduate**

The Johns Hopkins University, Baltimore, Maryland, USA  
Dates attended: 08/1967–02/1972  
Degree: Ph. D. (Mechanics)

- **Undergraduate**

National Taiwan University, Taipei, Taiwan  
Dates attended: 08/1960–06/1964  
Degree: B. Sci. (Civil Engineering)

### D. Professional Experiences

Present Position: Full Professor  
Institute of Mathematics, Federal University of Rio de Janeiro

- 1/2006–7/2006: Visiting Professor  
Department of Mechanical Engineering  
Texas A&M University, College Station, Texas, USA

- 2/2004: Visiting Professor  
Nagoya Institute of Technology, Nagoya, Japan
- 7/2002–10/2002: Director Pro-Tempore  
Instituto de Matemática, Universidade Federal do Rio de Janeiro
- 8/2000–10/2000: Alexander von Humboldt Research Fellow  
Institut für Verfahrenstechnik, Technische Universität Berlin, Germany
- 9/1999: Visiting Fellow  
Weierstrass Institute for Applied Analysis and Stochastics, Berlin, Germany
- 2/1990–1/1991: Visiting Professor  
Hermann Föttinger Institut, Technische Universität Berlin, Germany
- 2/1987–7/1988: Visiting Professor  
Institute of Applied Mechanics, National Taiwan University
- 3/1986: Visiting Professor  
Istituto di Matematica Applicata, Università di Bologna, Italy
- 8/1985–2/1986: Alexander von Humboldt Research Fellow  
Hermann Föttinger Institut, Technische Universität Berlin, Germany
- 10/1982: Visiting Professor  
Istituto di Matematica Applicata, Università di Bologna, Italy
- 11/1981–12/1982: Alexander von Humboldt Research Fellow  
Hermann Föttinger Institut, Technische Universität Berlin, Germany
- 12/1976–2/1977: Visiting Research Fellow  
Mathematics Department, Carnegie Mellon University  
Pittsburgh, USA
- 4/1974–7/1974: Visiting Professor  
Graduate Program in Engineering  
Universidade Federal de Santa Maria, RS, Brasil
- 8/1972–to date: Professor  
Institute of Mathematics, Federal University of Rio de Janeiro  
Brazil
- 2/1972–8/1972: Post-doctoral Fellow  
Mechanics Department, the Johns Hopkins University, USA
- 8/1967–2/1972: Teaching and Research Assistant  
Mechanics Department, the Johns Hopkins University, USA
- 8/1965–7/1967: Teaching Assistant  
Civil Engineering Department, National Taiwan University  
Taipei, Taiwan

**E. Publications****• Thesis**

1. On irreversible thermodynamics  
Ph.D. Dissertation  
Thesis Advisor: Ingo Müller  
The Johns Hopkins University, Baltimore, U.S.A (1972)

**• Books**

1. Continuum Mechanics  
297 pp, ISBN: 3-540-43019-9  
Series: Advanced Texts in Physics  
Springer-Verlag, Berlin-Heidelberg-New York (2002)
2. Introdução ao Métodos de Elementos Finitos, Análise e Aplicação  
(with M. A. Rincon)  
ISBN: 85-87674-05-6 (in Portuguese)  
213 pp, (2001), 2<sup>a</sup> Ed., 237 pp, (2003)  
IM-UFRJ, Rio de Janeiro
3. A Continuum Mechanics Primer, on constitutive theories of materials  
Lecture note available online  
<http://www.dmm.im.ufrj.br/liu/Papers/MCURS.pdf>
4. Constitutive Theories: Basic Principles  
in Continuum Mechanics, Editores: Jose Merodio e Giuseppe Saccomandi  
in Encyclopedia of Life Support Systems (EOLSS)  
Developed under the auspices of the UNESCO Publications, Oxford, UK (2009)  
[<http://www.eolss.net/E6-161-toc.aspx/>]

**• Journal Articles**

1. Method of Lagrange multipliers for exploitation of entropy principle,  
Arch. Rational Mech. Anal. 46, 131-148 (1972)  
Doi: 10.1007/BF00250688
2. On thermodynamics and thermostatics of fluids in electromagnetic fields,  
(with I. Müller)  
Arch. Rational Mech. Anal. 46, 149-176 (1972)  
Doi: 10.1007/BF00250689
3. A non-simple heat-conducting fluid,  
Arch. Rational Mech. Anal. 50, 26-33 (1973)  
Doi: 10.1007/BF00251292
4. On the entropy supply in a classical and a relativistic fluid,  
Arch. Rational Mech. Anal. 50, 111-117 (1973)  
Doi: 10.1007/BF00249878

5. Wave propagation in fluids in electromagnetic fields,  
Arch. Rational Mech. Anal. 53, 347-358 (1974)
6. On the requirement that material symmetries shall preserve density,  
Arch. Rational Mech. Anal. 68, 19-26 (1978)  
Doi: 10.1007/BF00276176
7. On chemical potential and incompressible porous media,  
Journal de Mecanique 19, 327-342 (1980)
8. On fluid pressure and buoyancy force in porous media,  
Revista Brasileira de Tecnologia 11, 35-43 (1980)
9. Sobre a força resistiva em meios porosos anisotrópicos,  
(with R. Sampaio Filho)  
Revista Brasileira de Ciências Mecânicas 2, 21-24 (1980)
10. Termodinâmica de misturas fluido-sólido,  
(with G. M. Kremer)  
Revista Brasileira de Física 10, 275-292 (1980)
11. A note on material symmetry,  
(with C. C. Wang)  
Arch. Rational Mech. Anal. 74, 277-296 (1980)  
Doi: 10.1007/BF00280543
12. Os tensores de condutividade térmica e resistividade em misturas  
transversalmente isotrópicas,  
(with G. M. Kremer)  
Revista Brasileira de Física, 10, 921-936 (1980)
13. Propagação de ondas de aceleração em misturas  
transversalmente isotrópicas,  
(with G. M. Kremer)  
Revista Brasileira de Física 11, 543-558 (1981)
14. A note on transversely isotropic functions,  
Anais de Academia Brasileira de Ciência 54, 5-8 (1982)
15. On representations of anisotropic invariants.  
Int. J. Engng Sci. 20, 1099-1109 (1982)  
Doi: 10.1016/0020-7225(82)90092-1
16. Decay of electromagnetic waves in fluids,  
(with G. M. Kremer)  
J. Non-Equilib. Thermodyn. 8, 67-74 (1983)
17. Extended thermodynamics of classical and degenerate ideal gases,  
(with I. Müller)  
Arch. Rational Mech. Anal. 83, 285-332 (1983)  
Doi: 10.1007/BF00963838

18. Extended thermodynamics of fluids and virial equations of state,  
Arch. Rational Mech. Anal. 88, 1-23 (1985)  
Doi: 10.1007/BF00250680
19. On structure of balance equations and extended field theories  
of mechanics,  
Il Nuovo Cimento 92B, 121-141 (1986)  
Doi: 10.1007/BF02732642
20. Relativistic thermodynamics of gases,  
(with I. Müller, T. Ruggeri)  
Annals of Physics, 169, 191-219 (1986)  
Doi: 10.1016/0003-4916(86)90164-8
21. An extended field theory of viscoelastic materials,  
Int. J. Engng Sci. 26, 331-342 (1988)  
Doi: 10.1016/0020-7225(88)90113-9
22. Extended thermodynamics of viscoelastic materials,  
Continuum Mech. Thermodyn. 1, 143-164 (1989)  
Doi: 10.1007/BF01141999
23. Hyperbolic system for viscous fluids and simulation of shock tube flows,  
(with J. A. Salvador)  
Continuum Mech. Thermodyn. 2, 179-197 (1990)  
Doi: 10.1007/BF01129596
24. On Fourier's law of heat conduction,  
Continuum Mech. Thermodyn. 2, 301-305 (1990)  
Doi: 10.1007/BF01129123
25. Hyperbolic system of field equations for viscous fluids,  
(with G. M. Kremer)  
Mat. Aplic. Comp. 9, 123-135 (1990)
26. Energy control of numerical solutions of an elastic oscillator,  
(with I. Suliciu)  
Mathematics and Computers in Simulation 33, 209-221 (1991)  
Doi: 10.1016/0378-4754(91)90120-R
27. On interface equilibrium and inclusion problems,  
Continuum Mech. Thermodyn. 4, 177-186 (1992)  
Doi: 10.1007/BF01130289
28. Stability of thick spherical shells,  
Continuum Mech. Thermodyn. 7, 249-258 (1995)  
Doi: 10.1007/BF01178591

29. Oscillation waves in Riemann Problems inside elliptic regions for conservation laws of mixed type,  
(with H. Frid)  
*Z. angew. Math. Phys. (ZAMP)* 46, 913-931 (1995)  
Doi: 10.1007/BF00917877
30. Phase mixtures in Dynamics of Pseudoelasticity,  
(with H. Frid)  
*Continuum Mech. Thermodyn.* 7, 475-487 (1995)  
Doi: 10.1007/BF01175668
31. Vanishing relaxation limit of viscoelasticity,  
(with Y. Wu)  
*Mathematics and Mechanics of Solids*, 1, 227-241 (1996)  
Doi: 10.1177/108128659600100206
32. Entropy flux - heat flux relation in thermodynamics with Lagrange multipliers,  
*Continuum Mech. Thermodyn.* 8, 247-256 (1996)  
Doi: 10.1007/s001610050042
33. Phase transitions and oscillation waves in an elastic bar  
(with H. Frid)  
*Matemática Contemporânea*, 10, 123-135 (1996)
34. Oscillation waves in Riemann Problems for phase transitions,  
(with H. Frid)  
*Quarterly Appl. Math.* 56, 115-135 (1998)
35. Instability of a square sheet under symmetric biaxial loading,  
(with W. A. de Neves)  
*J. of Braz. Soc. Mechanical Sciences*, 22, 545-549 (2000)  
Doi: 10.1590/S0100-73862000000400004
36. Constitutive equations of extended thermodynamics from a hybrid pair of generator functions,  
*Continuum Mech. Thermodyn.* 13, 25-39 (2001)  
DOI:10.1007/s001610100040.
37. Iterative approximation of stationary heat conduction in extended thermodynamics,  
(with M. A. Rincon, I. Müller)  
*Continuum Mech. Thermodyn.* 14, 483-493 (2002)  
DOI:10.1007/s001610200090.
38. Effect of moving boundaries on the vibrating string,  
(with M. A. Rincon)  
*Applied Numerical Mathematics*, 47, 159-172 (2003)

39. On numerical approximation of an optimal control problem in linear elasticity,  
(with M. A. Rincon)  
Divulgaciones Matemáticas, 11, 91-107 (2003)  
<http://www.emis.de/journals/DM/vXI2/art1.pdf>
40. On the transformation property of the deformation gradient under a change of frame,  
J. Elasticity, 71, 73-80 (2003)  
Doi: 10.1023/B:ELAS.0000005548.36767.e7
41. A boundary value problem in extended thermodynamics – one-dimensional steady flows with heat conduction,  
(with M. A. Rincon)  
Continuum Mech. Thermodyn. 16, 109-124 (2004)  
doi:10.1007/s00161-003-0144-2.
42. On Euclidean objectivity and the principle of material frame-indifference,  
Continuum Mech. Thermodyn. 16, 177-183 (2004)  
doi:10.1007/s00161-003-0149-x.
43. Existence and uniqueness of solutions of elastic string with moving ends,  
(with M. A. Rincon)  
Math. meth. Appl. Sci. 27, 1641-1655 (2004)  
doi:10.1002/mma.517.
44. O princípio de Saint-Venant em elasticidade não linear,  
(with J.D. da Silva, J.A. Ferreira)  
Tend. Mat. Apl. Comput. 5, No. 2 (2004) 335-343.
45. Further remarks on Euclidean objectivity and the principle of material frame-indifference,  
Continuum Mech. Thermodyn. 17, 125-133 (2005)  
doi: 10.1007/s00161-004-0191-3.
46. Existence and uniqueness of solutions of a nonlinear heat equation,  
(with M.A. Rincon, J. B. Límaco)  
Tend. Mat. Apl. Comput. 5, No. 2 (2005), 273-284.
47. On well-posedness of classical boundary conditions in extended thermodynamics,  
Proceedings of International Symposium on Trends in Applications of Mathematics to Mechanics (STAMM-2004), 225-233  
Ed. by Y. Wang and K. Hutter, Shaker Verlag (2005).
48. Error estimates of vibrations of elastic string with moving ends,  
(with M. A. Rincon)  
Applied Numerical Mathematics, 56, 745-755 (2006).

49. Shock structure in viscoelasticity of relaxation type,  
(with Y. Wu),  
Nonlinear Analysis: Theory Methods & Applications, 65, 785-794 (2006)  
doi:10.1016/j.na.2005.10.001.
50. Weighted iterative solutions of linear differential equations and  
heat conduction of ideal gases in moment theory,  
(with D. R. Vieira)  
Z. angew. Math. Phys. (ZAMP), 57, 1075-1091 (2006)  
doi:10.1007/s00033-005-0048-z.
51. A nonlinear heat equation with temperature-dependent parameters,  
(with M. A. Rincon, J. Limaco)  
Mathematical Physics Electronic Journal (MPEJ) 12, Paper 5 (2006).  
(<http://www.ma.utexas.edu/mpej/Vol/12/5.pdf>).
52. A method of differential iteration for boundary value problem  
in extended thermodynamics,  
Nonlinear Analysis: Real World Applications, 8, 1113-1131 (2007).  
doi:10.1016/j.nonrwa.2006.06.003.
53. Entropy flux relation in viscoelastic bodies  
J. Elasticity, 90, 259-270, (2008).  
doi:10.1007/s10659-007-9142-0.
54. Numerical analysis of quenching - heat conduction in metallic materials  
(with M. G. Teixeira, M. A. Rincon)  
Appl. Math. Modelling, 33, 2464-2473 (2009).  
doi:10.1016/j.apm.2008.07.015.
55. On entropy flux of transversely isotropic elastic bodies  
J. Elasticity, 96, 97-104 (2009).  
doi:10.1007/s10659-009-9200-x.
56. Constitutive theory of anisotropic rigid heat conductors  
Journal of Mathematical Physics, 50, 083506 (2009).  
doi:10.1063/1.3190487.
57. Successive linear approximation for finite elasticity  
(with R.A. Cipolatti; M.A. Rincon)  
Computational and applied Mathematics, 29, 465-478 (2010)  
doi:10.1590/S1807-03022010000300008.



**F. Conference Papers**

1. V Encontro Sobre Escoamento em Meios Porosos  
Rio de Janeiro - RJ, 12-14/10 (1977)  
- Sobre a anisotropia dos meios porosos  
(with R. Sampaio Filho)  
Anais do ENEMP 5, I.3/1-15
2. VI Encontro Sobre Escoamento em Meios Porosos  
Rio Claro - SP, 11-13/10 (1978)  
- Sobre potencial químico e pressão do fluido em meios porosos  
(with J. A. Salvador)  
Anais do ENEMP 6, I1/1-23
3. VII Encontro Sobre Escoamento em Meios Porosos  
Aracajú - Sergipe, 11-13/10 (1979)  
- On pressure and buoyancy force in porous media  
Anais do ENEMP 7, 221-238
4. VII Encontro Sobre Escoamento em Meios Porosos  
Aracajú - Sergipe, 11-13/10 (1979)  
- Termodinâmica de misturas fluido-sólido  
(with G. M. Kremer)  
Anais do ENEMP 7, 269-290
5. VIII Encontro Sobre Escoamento em Meios Porosos  
Curitiba - Paraná, 20-22/10 (1980)  
- Propagação de ondas de aceleração em misturas transversalmente isotrópicas  
(with G. M. Kremer)  
Anais do ENEMP 8, 237-255
6. VIII Encontro Sobre Escoamento em Meios Porosos  
Curitiba - Paraná, 20-22/10 (1980)  
- A note on transversely isotropic functions  
Anais do ENEMP 8, 256-269
7. VIII Encontro Sobre Escoamento em Meios Porosos  
Curitiba - Paraná, 20-22/10 (1980)  
- Os tensores de condutividade térmica e resistividade em misturas transversalmente isotrópicas  
(with G. M. Kremer)  
Anais do ENEMP 8, 414-436
8. Gesellschaft für Angewandte Mathematik und Mechanik – Jahrestagung 1982  
(GAMM-Conference)  
Budapest, Hungria, 13-16/04 (1982)  
- Decay of electromagnetic waves in fluids  
(with G. M. Kremer)  
Abstract p.195

9. XXI Seminário Brasileiro de Análise  
Brasilia - DF, 14-17/05 (1985)  
- Symmetric hyperbolic systems and balance equations of thermodynamics  
SBA 21, 171-180
10. The Sixth Symposium on  
Trends in Applications of Pure Mathematics to Mechanics  
Bad Honnef, Germany, 21-25/10 (1985)  
- Virial coefficients from extended thermodynamics  
Lecture Notes in Physics, Vol. 249, 51-55, Springer 1985
11. XII Congresso Nacional de Matemática Aplicada e Computacional  
Sao Jose do Rio Preto - SP, 04-08/09 (1989)  
- Simulação numérica de onda de choque com efeito de viscosidade  
(with J. A. Salvador)  
Resumo CNMAC 12, 226-229
12. Fifth Bilateral Polish-Italian Meeting on Thermodynamics and kinetic Theory  
Madralin, Warsaw, Poland, 28-31/08 (1990)  
- Extended thermodynamics of viscoelasticity  
*Thermodynamics and Kinetic Theory*,  
Proceedings Ed. by: W. Kosinski, W. Larecki, A. Morro & H. Zorski  
Series on Advances in Math. for Appl. Sci. vol 12. 93-106  
World Scientific Publishing, Singapore 1992
13. Euromech Colloquium 270 on Nonlinear Waves  
Governed by Hyperbolic Dissipative Models  
Reggio Calabria, Italy, 25-28/09 (1990)  
- Viscoelasticity in extended thermodynamics  
*Nonlinear Waves and Dissipative Effects*, Ed. by: D. Fusco & A. Jeffrey  
Pitman Research Notes in Mathematics 227, 218-230  
Longman Scientific & Technical, Essex 1991
14. XIII Congresso Nacional de Matemática Aplicada e Computacional  
Aguas de Lindóia - SP, 26-29/11 (1990)  
- Simulação numérica de ondas de choque via termodinâmica estendida  
de um fluido viscoso com condução de calor  
(with J. A. Salvador)
15. XIV Congresso Nacional de Matemática Aplicada e Computacional  
Nova Friburgo - RJ, 02-05/09 (1991)  
- Controle energético de soluções numéricas de um oscilador elástico  
Resumo CNMAC 14, p. 75
16. Twenty-second Midwestern Mechanics Conference  
University of Missouri-Rolla, USA, 06-09/10 (1991)  
- On thermodynamics of viscoelasticity

17. Mathematisches Forschungsinstitut Oberwolfach  
Meeting on *Thermodynamic Constitutive Theories*  
Oberwolfach, Germany, 03-07/02 (1992)  
- Interface equilibrium and inclusion problems
18. Seminário de Supercomputação Aplicada  
Centro Nacional de supercomputação (CESUP/UFRGS),  
Porto Alegre, RS, 12-14/09 (1994)  
- Numerical experiments of Riemann problems  
for conservation laws of mixed type  
(with H. Frid)  
Anais SuperComp 94, 261-264
19. Third SIAM Conference  
on Mathematical and Computational Issues in the Geosciences  
San Antonio, Texas, USA, 8-10/02 (1995)  
- Oscillation waves in Riemann problems for systems of mixed type  
(with H. Frid)
20. IV Workshop on Partial Differential Equations  
IMPA, Rio de Janeiro, RJ, 17-21/07 (1995)  
- Phase transitions and oscillation waves in an elastic bar  
(with H. Frid)  
Matemática Contemporânea, 10, 123-135 (1996)
21. XVIII Congresso Nacional de Matemática Aplicada e Computacional  
Curitiba, PR, 28/08-01/09 (1995)  
- Phase transition in elasticity and viscoelasticity  
Resumos CNMAC 95, 440-444
22. IV Encontro Regional de Matemática Aplicada e Computacional  
IPRJ/UERJ, Nova Friburgo, RJ, 10-12/04 (1996)  
- Some problems in finite elasticity  
Conferência
23. XLIII Seminário Brasileiro de Análise  
São Paulo, SP, 23-25/05 (1996)  
- The viscoelastic equations with relaxation  
(with Y. Wu)  
SBA 43, 311-322
24. 1996 ASME Mechanics & Materials Conference  
Symposium on Elasticity in Honor of Professor J. L. Ericksen  
The Johns Hopkins University, Baltimore, Md. U.S.A. 12-15/06 (1996)  
- Numerical solutions for phase transitions in elasticity  
*Contemporary research in the mechanics and mathematics of materials*,  
Ed. by: R. C. Batra and M. F. Beatty  
International Center for Numerical Methods in Engineering (CIMNE), Barcelona,  
Spain (1996), 287-297.

25. XIX Congresso Nacional de Matemática Aplicada e Computacional  
Goiânia, GO, 16-20/09 (1996)
  - Estudo de estabilidade de extensão biaxial numa placa quadrada  
(with W. A. das Neves)Resumos CNMAC 96, 474-475
26. Mathematisches Forschungsinstitut Oberwolfach  
Meeting on *Thermodynamic Constitutive Theories*  
Oberwolfach, Germany, 23-27/09 (1996)
  - Numerical solutions for dynamic formation of phase mixtures
27. 44° Seminário Brasileiro de Análise  
Ribeirão Preto - SP, 21-23/11 (1996)
  - Constitutive theories of mechanicsSBA 44, 35-118, Minicurso
28. XXI Congresso Nacional de Matemática Aplicada e Computacional  
Caxambu, MG, 14-18/09 (1998)
  - Solução analítica e numérica para o controle ótimo da equação de Poisson  
(with Mauro A. Rincon)Resumo das Comunicações CNMAC 98, 6
29. XXI Congresso Nacional de Matemática Aplicada e Computacional  
Caxambu, MG, 14-18/09 (1998)
  - Transformation of deformation gradient under change of frameResumo das Comunicações CNMAC 98, 236
30. XXI Congresso Nacional de Matemática Aplicada e Computacional  
Caxambu, MG, 14-18/09 (1998)
  - Shock structure in vanishing relaxation limit  
(with Yumei Wu)Resumo das Comunicações CNMAC 98, 239
31. 48° Seminário Brasileiro de Análise  
LNCC, Petrópolis - RJ, 25-28/11 (1998)
  - Introdução ao método dos elementos finitos e controle ótimo  
(with Mauro A. Rincon)SBA 48, 261-347, Minicurso
32. 48° Seminário Brasileiro de Análise  
LNCC, Petrópolis - RJ, 25-28/11 (1998)
  - Elastic shock solutions in vanishing relaxation limit  
(with Yumei Wu)SBA 48, 985-993
33. XXII Congresso Nacional de Matemática Aplicada e Computacional  
Santos, SP, 13-17/09 (1999)
  - Solução numérica do problema da corda elástica com fronteira livre  
(with Mauro A. Rincon)Resumo das Comunicações, CNMAC 99, 262

34. 50° Seminário Brasileiro de Análise  
São Paulo, SP 24-27/11 (1999)  
- Estudo numérico de vibração da corda elástica com fronteira móvel  
(with Mauro A. Rincon)  
SBA 50, 609-624
35. 3ª Jornada de Matemática Aplicada e Computacional  
Petrópolis, RJ, 24/04 (2000)  
- Análise e simulação numérica da vibração da corda elástica com fronteira móvel  
(with Mauro A. Rincon)  
Anais, vol. 3, 1-13
36. 2000 SIAM Annual Meeting  
Rio Grande, Porto Rico, 10-14/07 (2000)  
- Nonlinear model of vibrating elastic string with moving ends  
(with Mauro A. Rincon)  
Abstract, vol. 1, 70
37. Analysis and Numerics of Conservation Laws (ANumE),  
Workshop on Boltzmann and Transport Equations  
Blaubeuren, Germany, 28/08-01/09 (2000)  
- Mixed representations for extended thermodynamics  
Local organization: Universität Tübingen, Germany  
Program, p. 19
38. XXIII Congresso Nacional de Matemática Aplicada e Computacional  
Santos, SP, 11-15/09 (2000)  
- Modelo linear de vibração da corda elástica com fronteira móvel  
(with Mauro A. Rincon)  
CNMAC 23, 8
39. International Conference in Potsdam –  
on Continuum Mechanics & Thermodynamics  
Potsdam, Germany, 30/07-03/08 (2001)  
- Iterative approximation of boundary value problems  
in extended thermodynamics  
Program, p. 2
40. International Workshop on Numerical Linear Algebra,  
Numerical Methods for Partial Differential Equations  
and Optimization  
Curitiba, PR, 20-23/08 (2001)  
- Effect of a Moving Boundary on the Vibrating Elastic String  
(with Mauro A. Rincon)  
Atas do congresso, p. 51

41. XXIV Congresso Nacional de Matemática Aplicada e Computacional  
Belo Horizonte, MG, 10-13/09 (2001)
  - Estimativa de erro em elementos finitos do modelo da corda elástica com fronteira móvel  
(with Mauro A. Rincon)  
Resumo das Comunicações, p. 392
42. 14th U.S. National Congress of Theoretical and Applied Mechanics  
Blacksburg, Virginia USA, 23-28/06 (2002)
  - On the determination of unconventional boundary conditions for system of moment equations  
Proceedings of Contemporary Research in Theoretical and Applied Mechanics (ISBN 0-9721257-0-1), p. 293
43. XXVI Congresso Nacional de Matemática Aplicada e Computacional  
São José do Rio Preto, SP, 08-11/09 (2003)
  - On boundary value problems in extended thermodynamics  
A case study of uncontrollable boundary data  
(with Mauro A. Rincon)  
Resumo das Comunicações, p. 418
44. XXVI Congresso Nacional de Matemática Aplicada e Computacional  
São José do Rio Preto, SP, 08-11/09 (2003)
  - O princípio de Saint-Venant em elasticidade não linear  
(with Joccitiel D. da Silva)  
Resumo das Comunicações, p. 606
45. 61° Seminário Brasileiro de Análise  
São João del Rey, MG, 18-20/05 (2005)
  - Método iterativo para problemas de ponto fixo de operadores diferenciais  
(with Daniel R. Vieira)  
SBA 61, 163-170
46. The Fifth Annual Hawaii International Conference  
on Statistics, Mathematics and Related Field  
Honolulu, Hawaii, USA, 16-18/01 (2006)
  - An iterative method for fixed-point problems of differential operators  
Proceedings: 1152-1160
47. Congresso de Matemática e suas Aplicações (FOZ2006)  
Foz do Iguaçu, PR 07-11/08 (2006)
  - Incremental linear approximation of large deformations in finite elasticity  
(with Rolci A. Cipolatti, Mauro A. Rincon)
48. Internal Conference on Numerical Analysis and Applied Mathematics  
Hersonissos, Crete, Greece, 15-19/09 (2006)
  - Incremental linear approximation for finite elasticity  
(with Rolci A. Cipolatti, Mauro A. Rincon)

Proceedings of ICNAAM 2006: 199-202,  
Eds. T. E. Simos, G. Psihoyios and Ch. Tsitouras,  
ISBN: 3-527-40743-X, Wiley-VCH Verlag, Weinheim (2006)

49. XIV International Conference on Waves and Stability in Continuum Mechanics  
Scicli, Ragusa, Italy, 30/06-07/07 (2007)  
- Numerical simulation of large deformations in solid bodies, instability of density  
inversion in layered structure
50. International Workshop on New directions in Continuum Mechanics:  
on the interplay among mathematics, mechanics and physics  
Castro Urdiales, Cantabria, Spain, 08-11/09 (2008)  
- Successive linear approximation for finite elasticity - Bending of a rectangular  
block
51. Meeting of collaborators in the Continuum Mechanics book for UNESCO-EOLSS  
encyclopedia (<http://www.eolss.net/E6-161-toc.aspx>)  
Editores: Jose Merodio e Giuseppe Saccomandi  
Castro Urdiales, Cantabria, Spain, 11-12/09 (2008)  
- Chapter 6: Constitutive Theories: Basic Principles
52. 2009 SIAM Conference on Mathematical & Computational Issues  
in the Geosciences  
Leipzig, Germany, 15-18/06 (2009)  
- Large deformation in viscoelastic solid bodies - Numerical simulations of salt  
migration

## G. Courses Lectured

### • Undergraduate level

- Linear algebra:  
Basic concept in finite dimensional vector space, solution of linear system and eigenvalue problems, ...
- Tensor analysis:  
Tensor algebra and tensor calculus in Euclidean space.
- Calculus II:  
Linear ordinary different equations with constant coefficients, sequence, infinite series. ...
- Calculus III:  
Surface and volume integrals, divergence and Stokes theorems. ...
- Calculus IV:  
Ordinary and partial differential equations, Laplace transform, Fourier series, boundary value problems. ...
- Applied mathematics:  
Ordinary and partial differential equations, Sturm-Liouville problem, orthogonal functions, ...

### • Graduate level

- Continuum mechanics:  
Kinematics, balance equations, constitutive theories of material bodies, representation theorems of isotropic functions
- Continuum thermodynamics:  
General entropy inequality, entropy principle, method of Lagrange multipliers, thermodynamics of isotropic solid and viscous fluids with heat conduction
- Finite elasticity:  
Some exact solutions in isotropic elastic bodies in static and dynamic problems, variational formulation and finite element solutions
- Special topics in continuum mechanics:  
Mixture theories, porous media, wave propagation, extended thermodynamics, boundary value problems in moment systems, ...



**H. Research Interests**

- General and fundamental issues of continuum mechanics and thermodynamics
- Constitutive theories of materials bodies, general entropy principle and method of Lagrange multipliers
- Theories of mixtures and porous media
- Numerical problems in continuum mechanics
- Extended thermodynamics of gases, fluids and viscoelastic solids
- Boundary value problems of extended thermodynamics

**I. Other Activities**

- Member: Sociedade Brasileira de Matemática
- Member: Sociedade Brasileira de Matemática Aplicada e Computacional
- Member: International Society for the Interaction of Mechanics and Mathematics
- Member: American Mathematical Society
- Editorial board: Journal of Mathematical Sciences: Advances and Applications (<http://scientificadvances.org/journals1.htm>)
- Editorial board: Journal of Mechanics of Multi-Component Materials