Summary Résumé: Gautam Dasgupta — March 5, 2006

I: Professional Preparation

(a)	Undergraduate:	B. E. College	Calcutta University	Civil Engineering	BE 1967
(b)	Graduate:	B. E. College	Calcutta University	Applied Mechanics	ME 1969
(c)	Graduate:	Str. Engg. Str. Mech.	U. C. Berkeley	Structural Mechanics	PhD 1974
(d)	Postdoctoral:	Str. Engg. Str. Mech.	U. C. Berkeley	Structural Mechanics	1974 –77

II: Current position

Columbia University, Professor, Civil Engg. Engg. Mech., (appointment: 1977 as Asst. Prof.)

III: Publications

Journal: 25 (single author), 40 (joint); Proceedings: exceeds 50; Invited Papers: exceeds 12; Invited Seminars: National exceeds 50; International exceeds 75;

IV: Fellowship

(a) Alexander von Humboldt Stiftung, Germany, 1986-

(b) Fulbright Senior Professorship, Washington D.C., 1998-99

(c) Guest Faculty Member

i. Technische Universität, Wien, Austria, 1982-92, *Associate Professor*

ii. Bundeswahr Universität, Hamburg, Germany, 1986-87, *Associate Professor*

iii. Technische Universität, Braunschweig, Germany, 1993-94, *Associate Professor*

iv. Nat. Sc. Council Fellowship, Murmansk U, Russia, 1997, *Professor*

v. Indian Institute of Technology, Kharagpur, India, 1998, *Professor*

vi. Indian Statistical Institute, Calcutta, India, 1999, *Professor*

vii. Laboratoire d'Optique P.M. Duffieux, Université de Franche-Comté, Besançon, France, currently from 2001 to present, *Senior visiting scholar*

V: Cumulative Research Grant and patent:

(a) National Science Foundation: $916,000 and National Institutes of Health: $300,000 (as principal investigator: $1,091,000; co- principal investigator: $375,000)

(b) Columbia University Academic Quality Fund: $250,000

(c) U.S. Patent No. 6,101,450 of Gautam Dasgupta (via Columbia University) for "Stress Analysis Using a Defect-Free Four Node Finite Element Technique"

VI: Current Research Collaboration

(a) Dr. E. L. Wachspress, Prof. Emeritus, U. Tenn and U.C. Berkeley — *mathematical modeling*

(b) Sir Francis Thackeray, Transvaal Museum, Pretoria, South Africa — *anthropology*

(c) Dr. Jacques Treil, Clinique Pasteur, Toulouse, France

(d) Dr. Veikko Keränen, Rovaniemi University of Applied Sciences, Finland — *Computer Math*

VII: Consulting Experiences

(a) Foundation Engineering: Bechtel Corporation, 1972 – 1974

(b) Probabilistic Structural Analysis: NASA- Lewis Center, 1981 –1985

(c) Computer Mathematics Research Consultant: Rovaniemi Polytechnic, Rovaniemi and Business Advantage, Espoo, Finland, 1991 – 1995

VIII: Editorship and Chair

(a) ASCE, J. Engg. Mech. (Elasticity, 1980 – 1985)

(b) ASCE, J. Engg. Mech. (Bioengineering, 1990 – 1995)

(c) International *Mathematica* Symposium (Chair, Ex. Comm – 1995 – 2003)

Selected Publications

***Selected* Current Publications**

1. **Accepted as Archive (ASCE, J. Aerospace Engineering) Papers – *single authored***
   (a) Closed-form Isoparametric Shape Functions,
   (b) Stiffness Matrix and Exact Integration with Isoparametric Shape Functions
2. **Published as Journal Papers – *single authored***
   (a) Approximate dynamic responses in random media, Acta Mechanica, Springer Verlag, 1992, vol.3, pp. 99-114.
   (b) G. Dasgupta, Stochastic Constitutive Modeling for Electrorheological Media, International Journal of Intelligent Material Systems and Structures, Technomic, Lancaster, Pennsylvania, USA, June 1994, pp. 88 100.
   (c) Tessellica: A defect-free finite element paradigm, Journal on Logic, History and Educational Com- puting, Computer Science, Helsinki University of Technology, Helsinki, Finland, 1996, pp. 230 – 242.
   (d) Stochastic boundary elements, Probabilistic Engineering Mechanics, CMPL, vol. 12, no. 4, 1997, pp. 290 – 294.
   (e) Finite elements beyond Courants Triangulation, Innovation in Mathematics, Computational Me- chanics Publication, Ashurst, UK, May 1997, pp. 107-114.
   (f) Reliability analysis with Interval arithmetic, Mathematics with Vision, Computational Mechanics Publication, Ashurst, 1999 UK, pp. 111-118.
   (g) Iterative Simulation for Stochastically Nonlinear Large Variability, J. Aero. Enggr. ASCE, vol. 13, no. 1, January 2000, pp. 1116.
   (h) Greens Functions for Random Media, J. Chinese Institute of Engineers, Nat. Taiwan Univ. Sc. and Tech. Taipei, Taiwan, vol. 23, no. 3, May 2000, pp. 18.
   (i) Interpolants Within Convex Polygons: Wachspress Shape Functions, Journal of Aerospace Engi- neering, ASCE, vol. 16, no. 1, January 2003, pp. 18.
   (j) Integration Within Polygonal Finite Elements, Journal of Aerospace Engineering, ASCE, vol. 16, no. 1, January 2003, pp. 918.
3. **Accepted Journal (Computers and Math. with Applications) Papers – *joint authorship***
   (a) with E. L. Wachspress, The Adjoint for an Algebraic Finite Element, acceptance number: 5892
   (b) with E. L. Wachspress, Basis Functions for Concave Polytgons, acceptance number: 6441
4. **Published as Archive Journal Papers – *joint authorship***
   (a) A. P. S. Selvadurai and G. Dasgupta, Harmonic response of smoothly embedded rigid sphere, Journal of Engineering Mechanics, ASCE, New York, NY, vol. 116, no. 9, September 1990, pp. 1945 – 1958.
   (b) O. Vilmann, and G. Dasgupta, Fundamental solutions for stochastic Mindlin plates, International Journal of Engineering Analysis, CMPL, vol. 9, 1992, pp. 47–59.
   (c) Gyebi, O. K., and Dasgupta, G., Finite element analysis of viscoplastic soils with Q-factor, International Journal for Soil Dynamics and Earthquake Engineering, Springer Verlag, vol. 11, no. 4, 1992, pp. 187-192.
   (d) McAlarney, M. E. , G. Dasgupta, M. L. Moss and L. Moss-Salentijn, Anatomical macroelement in the study of cranial facial rat growth, Journal of Cranial Facial Growth and Developmental Biology, New York, New York, USA, vol. 12, 1992, pp. 3–12.
   (e) Weiner, C, M. Sára, G. Dasgupta and U. B. Sleytr, Affinity Cross-Flow Filtration: Purification of IgG with a Novel Protein Affinity Matrix Prepared from Two-Dimensional Protein Crystals, Biotechnology and Bioengineering, John Wiley, vol. 44, 1994, pp. 55 – 65.
   (f) Andre S. Publico and M. E. McAlarney and L. Moss-Salentijn and G. Dasgupta, Further investigations into a non-landmark tensorial form difference tecnique, Bioengineering 1997, American Society of Mechanical Engineers, April 1997, pp. 565–566.
   (g) G. Dasgupta and J. Treil, Maxillo-Facial Frame: Finite Element Shapes, The Mathematica Journal, Champaign, Ill., vol 8, no. 2, 2001, pp. 235–246.
   (h) Dasgupta, G. , A. N. Papusha and E. A. Malsch, First order perturbation in boundary elements, Int. J. Engineering Analysis with Boundary Elements, Wessex Inst. Tech. Publication,

Southampton, UK, Elsevier Science, vol. 25, December 2001, pp. 741–751.

(i) Dasgupta, G. and E. A. Malsch, Boundary Element color interpolation for instrumentation, imaging and internet graphics industry, Int. J. Engineering Analysis with Boundary Elements, Wessex Inst. Tech. Publication, Southampton, UK, Elsevier Science, vol. 26, December 2002, pp. 379—389.

(j) M.E. McAlarney, A.S. Publico, S-Y. Yu, L. Moss-Salentijn and G. Dasgupta, Prenatal eye growth analysis via outline tensorial scaling analysis Orthodontics & Craniofacial Research, 2003.

(k) Malsch, Elisabeth Anna and G. Dasgupta, Interpolations for temperature distributions: a method for all non-concave polygons, International Journal of Solids and Structures, Vol. 41, no. 8, April, 2004, pp. 2165-2188.

(l) Malsch, Elisabeth A., Lin, John Jeffy, and Gautam Dasgupta, Smooth two dimensional interpolants: a recipe for all polygons, Journal of Graphics Tools,(ACM: 2005) v.10, n.2, pp. 27–39.

(m) Elisabeth Malsch and Gautam Dasgupta, Shape functions for polygonal domains with interior nodes, International Journal for Numerical Methods in Engineering, October 2004, v.61, issue 8, pp.1153–1172.

(n) Elisabeth A. Malsch and Gautam Dasgupta, Algebraic construction of smooth interpolants on polygonal domains, The *Mathematica* Journal, 2005,pp. 1 – 10.

***Selected* Old Publications**

5. **Archived Journal Papers – *single authored***

(a) A numerical solution for viscoelastic half planes, Journal of the Engineering Mechanics Division, American Society of Civil Engineers, New York, NY, vol. 102, no. EM4, August 1976, pp. 601 – 612.

(b) Foundation impedance matrices by substructure deletion, Journal of the Engineering Mechanics Division, American Society of Civil Engineers, New York, NY, vol. 106, no. EM3, June 1980, pp. 517 – 523.

(c) Viscoelastic responses of finite bodies by Quadrature form of correspondence principle, Journal of Applied Mechanics ASME, New York, NY, vol. 48, March 1981, pp. 206 – 207.

(d) Sommerfeld radiation conditions and cloning algorithm, New Concepts in Finite Element Analysis, American Society of Mechanical Engineers, New York, NY, AMD-vol. 44, 1981, pp. 47–66.

(e) A finite element formulation for unbounded homogeneous continua, Journal of Applied Mechanics ASME, New York, NY, vol. 104, March 1982, pp. 136 – 140.

(f) Computation of exterior potential fields by infinite substructuring, Computer Methods in Applied Mechanics and Engineering, Elsevier Science (North-Holland), vol. 46, 1984, pp. 295 – 305.

(g) Evaluation of added mass by a cloning algorithm, International Journal of Numerical Methods in Engineering, vol. 21, 1985, pp. 1157–1164.

(h) Validity of Almansi theorems for anisotropic boundary elements, International Journal of Engineering Analysis, Computational mechanics Publication, Ashurst, UK,(CMPL) vol. 5, no. 2, 1988, pp. 89–94.

(i) Boundary elements with *Mathematica*, International Journal of Software Engineering, CMPL, vol. 6, no. 1, January 1990, pp. 1–10.

(j) Modulated Boundary elements, International Journal of Software Engineering, CMPL, vol. 9, 1992, pp. 247–253.

6. **Archived Journal Papers – *joint authorship***

(a) G. Dasgupta and J. M. Kelly, Projectile impact on a thin, flexible structure: A singular dynamic contact phenomenon, Journal of Structural Mechanics, Marcel Dekker, vol. 5, no. 1, 1977, pp. 19 – 31.

(b) G. Dasgupta and J. L. Sackman, An alternative representation of the elastic-viscoelastic correspondence principle for harmonic oscillations, Journal of Applied Mechanics, American Society of Mechanical Engineers, New York, NY, vol. 99, no. 1, March 1977, pp. 57 – 60.

(c) G. Dasgupta and J. M. Kelly, Analysis of localized dynamic contact on structures using matched asymptotic expansions, Journal of Structural Mechanics, Marcel Dekker, vol. 6, no. 1, 1978, pp. 29 – 44.

(d) G. Dasgupta and J. L. Sackman, A Quadrature representation of the viscoelastic analogy in the frequency domain, Journal of Applied Mechanics, ASME, vol. 45, December 1978, pp. 955 –956.

(e) G. Dasgupta and A. K. Chopra, Dynamic stiffness matrices for viscoelastic half planes, J. Engineering Mechanics Division, ASCE, New York, NY, vol. 105, no. EM5, October 1979, pp. 729 – 745.

(f) M. L. Moss, R. Skalak, G. Dasgupta and H. Vilmann, Space, time, and space-time in craniofacial growth, American Journal of Orthodontics, C. V. Mosby, vol. 77, no. 6, June 1980, pp. 591 – 612.

(g) M. L. Moss, H. Vilmann, G. Dasgupta and R. Skalak, Craniofacial growth in space-time, Craniofacial Biology, Monograph no. 10, Craniofacial growth series, Center for Human Growth and Development, 1981, pp. 61 – 81.

(h) R. Skalak, G. Dasgupta, M. L. Moss, E. Otten P. Dullemeijr, and H. Vilmann, Analytical Description of Growth, Journal of Theoretical Biology, vol. 94, 1982, pp. 555 – 577.

(i) L-J Lee and G. Dasgupta, Interaction of nonlinear interiors with linear infinite exteriors, Computers and Structures, Pergamon Press, vol. 20, no. 1, 1985, pp. 339–353.

(j) X. Lee and G. Dasgupta, Analysis of structural variability with computer algebra, Journal of Engineering Mechanics, ASCE, New York, NY, vol. 114, no. 1, January 1988, pp. 161 – 171.

(k) A. P. S. Selvadurai and G. Dasgupta, Harmonic response of smoothly embedded rigid sphere, Journal of Engineering Mechanics, ASCE, New York, NY, vol. 116, no. 9, September 1990, pp. 1945 – 1958.

(l) O. Vilmann, and G. Dasgupta, Fundamental solutions for stochastic Mindlin plates, International Journal of Engineering Analysis, CMPL, vol. 9, 1992, pp. 47–59.

(m) McAlarney, M. E. , G. Dasgupta, M. L. Moss and L. Moss-Salentijn, Anatomical macro element in the study of cranial facial rat growth, Journal of Cranial Facial Growth and Developmental Biology, vol. 12, 1992, pp. 3–12.

7. **State-of-the-art Reports/Books – *reviewed as archive papers***

(a) Nondeterministic shape functions for finite element with stochastic moduli, vol. 2, 1989, pp. 1065–1072, IASSAR (International Assoc. of Structural Safety and Reliability, Igls, Austria)

(b) Stochastic finite element analysis of soil-structure systems, vol. 2, 1985, pp. 528–532, IASSAR

(c) Stochastic boundary element method, *to be published* 1997, IASSAR

(d) Green's functions for inhomogeneous media for boundary element applications, pp. 37 – 46, Advancements in Boundary Element, Computational mechanics Publication, Ashurst, August 1989, UK, vol. 1.

(e) Boundary elements with macro shape functions, pp. 253 –262, Advancements in Boundary Element, Computational mechanics Publication, Ashurst, August 1989, UK, vol. 1.

Teaching at Columbia University (1977-)

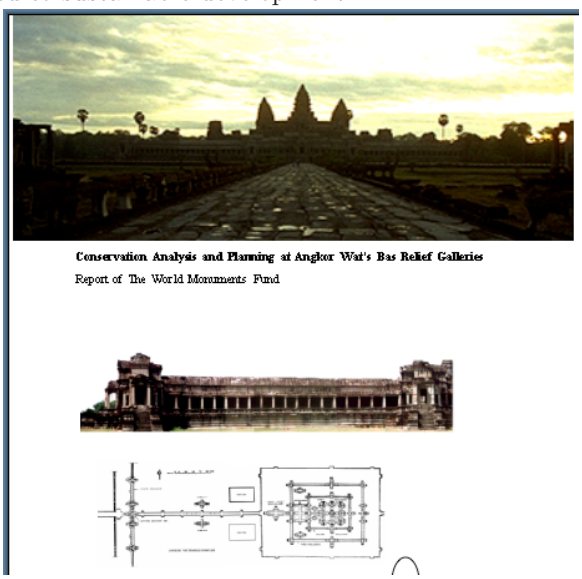
1. Undergraduate courses
   (a) Theoretical and Experimental Mechanics of solids
   (b) Structural analysis
   (c) Dynamics and vibrations
   (d) Introduction to Computer Programming (Fortran and *Mathematica*)
   (e) Introduction to Computer Graphics
   (f) Partial Differential Equations
   (g) Linear Algebra
   (h) Graphics Laboratory (Gateway Project)

2. Graduate courses
   (a) Partial differential equations
   (b) Mechanics of solids
   (c) Structural analysis
   (d) Advanced Finite element method (6000 level for MS/Ph.D students)
   (e) Computer aided engineering graphics
   (f) Reliability analysis
   (g) Mechanics of fracture and fatigue
   (h) Continuum mechanics: elasticity, inelasticity (8000 level for Ph.D students)

Extracts from Recent Presentations

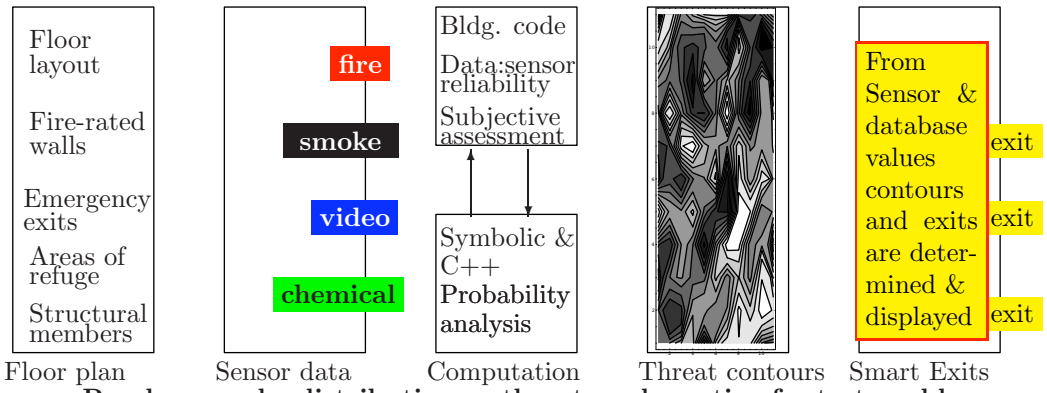
Sustainable Development Conference, Stanford University, September 2004 "Preservation of Historic Sites in Angkor, Cambodia"

The World Heritage Site of Angkor, Cambodia, is examined to explore some unconventional challenges in civil engineering — *mechanics of materials, stochastic computation, computer graphics and animation for CAD* — relative to issues of sustainable development. Structural deformation, which can be readily observed on numerous historic monuments will provide a basis for formulation and validation of the engineering mechanics research. The computational tool is based on LiveDesign and uses of combinatorics on words in modeling socio-economic policies. For the built environment stress analysis determines conservation policies and LiveDesign extends those into social sciences related to sustainable development.



Japan Society of Civil Engineers, Tokyo, January 2005 "Core Technology Development of LiveDesign"

Rescue/evacuation optimization is based on extreme value probabilistic analysis of threats

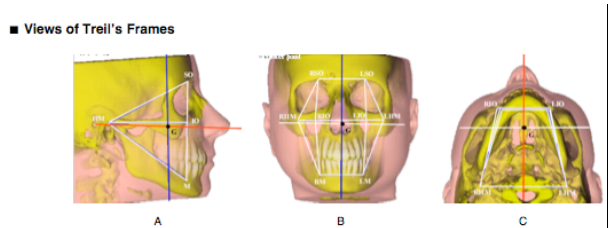


Random smoke distribution as threat : schematic of a test problem

Testing: The prototype will display evacuation/rescue paths when a user randomly assigns: (i) building design; (ii) sources of blasts, fires/smoke; (iii) intensity and location of a yet unknown threat.

The core IT employs `deep domain modeling` and virtual reality-based graphics.

Departmental Seminar, Ecole Polytechnique, Paris, January 2006 "Qualitative Features in Statistical Computations"



Modeling for maxillo-facial surgery is carried out with large kinematic morphometrics of engineering sciences integrated with the biological (and anatomical) knowledge of life sciencess. The Moss 'functional matrix hypothesis' provides the basis of encapsulation under the LiveDesign paradigm in this NSF — CNRS joint resarch.