PERSONAL VITA

NAME:		**Raj K. Rajamani**
CITIZENSHIP:		USA
ACADEMIC RANK:		Professor (1994–present) Interim Chair (1998-1999) Associate Professor (1988–1993) Assistant Professor (1983–1987) Research Assistant Professor (1979–1983) Department of Metallurgical Engineering, University of Utah, Salt Lake City, Utah 84112
DEGREES:	B.S. (Honours)	Chemical Engineering, Annamalai University, Madras, India, 1969
	M. Tech.	Chemical Engineering, Indian Institute of Technology, Kanpur, India, 1971
	M.E.	Chemical Engineering, University of Utah, 1973
	Ph.D.	Metallurgy, University of Utah, 1979.
COURSES TAUGHT:		Liberal Ed. 138-2: Energy Resources Met.E. 166: Introduction to Metallurgy Met.E. 320: Material and Energy Balances Met.E. 366: Introduction to Extractive Metallurgy Met.E. 5670: Mineral Processing — I Met.E. 5690: Process Engineering Statistics Met.E. 577: Electrometallurgy Met.E. 591: Instrumentation and Process Control for Extractive Metallurgical Operations Met.E. 625: Fundamentals of Engineering Computations Met.E. 626: Computer Applications in Metallurgy Met.E. 6550: Mathematical Modeling of Extractive Metallurgical Systems Met.E. 6560: Mathematical Modeling of Extractive Metallurgical Systems Met.E. 657: Stochastic Modeling of Metallurgical Processes
PROFESSIONAL		Society of Mining, Metallurgy and Exploration Engineers Inc.
RESEARCH INTERESTS:		Mathematical modeling of mineral processing and extractive metallurgical systems, coal processing, particle production and processing.
RESEARCH IN PROGRESS:		Modeling breakage kinetics in mills via impact energy spectra. Three-dimensional motion of media in ball mills: software development. Computational fluid dynamics of dense media hydrocyclones. Energy and wear studies on the High Pressure Grinding Roll, Modeling Agglomeration in Heap Leaching Process.

UNIVERSITY COMMITTEE ACTIVITIES:	College Faculty Relations Committee (2001–2003). Technology Transfer Committee (2003–2006). Funding Incentive Seed Grant Program Committee (2003–2006). College McGregor Library Committee (2003–2005). Department Director of Graduate Admissions (1989–). University Tenure and Promotion Committee (2010-2012)
OTHER ACTIVITIES	Assistant Director, Utah Comminution Center, University of Utah, 1982-1996 Member Operating Controls Committee, SME/AIME, 1983. Member Crushing and Grinding Committee, SME/AIME, 1983. Member Editorial Board, *KONA Powder and Particle Journal,* 1989–1995. Member Editorial Board, *Particulate Science and Technology Journal,* 1999–.
AWARDS	Antoine M. Gaudin Award, Presented by the Society of Mining, Metallurgy and Exploration Engineers Inc. "For his seminal work in the Application of discrete element methods in the modeling of charge Motion in semiautogenous and ball mill grinding, and for his Contribution to the basic science of comminution and classification", February 25, 2009.

5/08

LIST OF PUBLICATIONS

by

R. K. Rajamani

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2. "ESTIMILL: A Program for Grinding Simulation and Parameter Estimation with Linear Models, Program Description and Users Manual," J. A. Herbst, K. Rajamani and D. J. Kinneberg, Grinding Research Project Publication, University of Utah, 1977.
3. Reviewed Journal, "Successive Gas–Solid Reactions in a Porous Pellet: Application to the Reaction of Metals Sulfides in the Presence of Lime," H. Y. Sohn and K. Rajamani, Chem. Engg. Science **32**, 1093–1101 (1977).
4. Reviewed Journal, "In Stream Size Distribution Measurement for Grinding Circuit Control," J. A. Herbst, D. J. Kinneberg and K. Rajamani, in *International Symposium on In–Stream Measurement of Particulate Solid Properties, Pulse, November 1978*, eds. (1978).
5. "Control of Grinding Circuits," J. A. Herbst and K. Rajamani, in *Computer Methods for the 80s*, eds. (SME Press, 1978).
6. "DYNAMILL II — A Program for the Simulation of Grinding Circuit Dynamics and Control Using a Small Computer," J. A. Herbst, O. Bascur, and K. Rajamani, Grinding Research Project Publication, University of Utah, January 1979.
7. "Evaluation of Optimizing Control Strategies for Closed Circuit Grinding," J. A. Herbst and K. Rajamani, in *Proceedings of the XII International Mineral Processing Congress, Warzsawa, Poland, June 1979*, eds. (1979).
8. "Identification of Ore Hardness Disturbances in a Grinding Circuit Using a Kalman Filter," J. A. Herbst, K. Rajamani and W. T. Pate, in *Proceedings of the 3rd IFAC Symposium, Montreal, Canada, August 1980*, eds. (1980).
9. "A Dynamic Simulator for the Evaluation of Grinding Circuit Control Strategies," K. Rajamani and J. A. Herbst, in *European Symposium on Particle Technology*, eds. (1980).
10. Reviewed Journal, "Population Balance Approach to Ball Mill Scale–Up: Bench and Pilot Scale Investigations," J. A. Herbst, M. Siddique, K. Rajamani, and E. Sanchez, Mining Engineering (1982).
11. "Application of Modern Control Theory to Mineral Processing Operations," J. A. Herbst and K. Rajamani, in *12th Congress of the Council of Mining and Metallurgical Institutions, Johannesburg, May 1982*, eds. (1982).
12. "Developing a Simulator for Ball Mill Scale–Up. A Case Study," J. A. Herbst and K. Rajamani, in Design and Installation of Comminution Circuits, A. L. Mular and G. V. Jergensen II, eds. (SME/AIME, 1982).
13. Reviewed Journal, "Successive Gas Solid Reactions in a Porous Pellet: Application to a Pellet Made Up of a Uniform Mixture of Metal Sulphide Coated with an Outer Layer of Lime," K. Rajamani and H. Y. Sohn, Met. Trans. B **14B** (2), 175–180 (1983).
14. "Mill Speed as a Manipulated Variable for Ball Mill Grinding Control," K. Rajamani, in *Proceedings of the 4th IFAC Symposium, Helsinki, Finland, August 1983*, eds. (1983), pp. 153–160.
15. Reviewed Journal, "Simultaneous Estimation of Selection and Breakage Functions From Batch and Continuous Grinding Data," K. Rajamani and J. A. Herbst, I.M.M. Trans. Sec. C **93** (June), C74–C85 (1984).
16. Reviewed Journal, "Population Balance Model Prediction of the Performance of Large–Diameter Mills," J. A. Herbst, Y. C. Lo, and K. Rajamani, Minerals and Metallurgical Processing Journal (May) (1985).
17. "A Stochastic Model for Continuous Screening Design," K. Rajamani and R. Mehta, in *Proceedings of the 10th Anniversary Powder and Bulk Solids Conference, May 1985*, eds. (1985).
18. "Self Tuning Control of a Ball Milling Circuit," K. Rajamani, in *Proceedings of the Instrument Society of America Mining, Metallurgical Division, May 1985*, eds. (1985).
19. "An Evaluation of Procedures for the Measurement of Linear Grade Distributions in Liberation Analysis," K. Rajamani, Preprint, SME/AIME Annual Meeting, New York, February 1985.

Publications, cont.

20. Reviewed Journal, "Time–Driven and Event–Driven Monte Carlo Simulation of Liquid–Liquid Dispersions: A Comparison," K. Rajamani, W. T. Pate, and D. J. Kinneberg, Industrial Engineering and Chemistry Fundamentals **25**, 746–752 (1986).
21. "Coal/Water Suspension Transport through a Pipeline: Suspension Viscosity and Pressure Drop Studies," J. C. Baltzinger and K. Rajamani, in *Proceedings of the Powder and Bulk Solids Conference, Chicago, May 1986*, eds. (1986).
22. "A Phenomenological Model of the Hydrocyclone for Dilute Slurry Applications," K. Rajamani, in *Proceedings of the Second International Symposium on Beneficiation and Agglomeration, ISBA 86, Indian Institute of Metals, Bhubaneswar, India*, eds. (1986).
23. Reviewed Journal, "Comparison of Methods for the Measurement of Linear Grade Distributions in Liberation Analysis," C. L. Lin, J. D. Miller, J. A. Herbst and K. Rajamani, Particle Characterization Journal (4), 78–82 (1987).
24. "Reaction of an Irregular Particle with a Gas," K. Rajamani, in *Mathematical Modelling of Materials Processing Operations,* J. Szekely, L. B. Hales, H. Henein, N. Jarret, K. Rajamani and I. Samarsekera, eds. (The Metallurgical Society of AIME, 1987), pp. 693–703.
25. Reviewed Journal, "Improvements in the Classification Efficiency of a Hydrocyclone with an Impeller Installation around the Vortex–Finder," K. Rajamani, Particulate Science and Technology, an International Journal, 83–94 (1987).
26. Reviewed Journal, "Development of a Multicomponent Multisize Mineral Liberation Model," C. L. Lin, K. Rajamani, J. A. Herbst, and J. D. Miller, Minerals Engineering Journal **1** (2) (1988).
27. Reviewed Journal, "Phenomenological Model of the Hydrocyclone: Model Development and Verification for Single–Phase Flow," K. T. Hsieh and K. Rajamani, Int. J. Miner. Process. **22** (1988).
28. Reviewed Journal, "Design Considerations for Large Diameter Ball Mills," Y. C. Lo, N. Arbiter, J. A. Herbst and K. Rajamani, Int. J. Miner. Process. **22** (1988).
29. "Hydrocyclone Model: A Fluid Mechanic Approach," K. Rajamani and H. T. Hsieh, 117th Annual Meeting of AIME, Phoenix, Jan. 1988, Preprint no. 88–163.
30. Reviewed Journal, "Fuzzy Logic Controller: Application to Liquid Level Systems," I. Shah and K. Rajamani, Minerals and Metallurgical Processing Journal (1988).
31. Reviewed Journal, "Reaction of an Irregular Particle with a Gas: Monte Method for the Solution of the Pellet–Grain Model," K. Rajamani, Chem. Engg. Sci. **44** (10), 2345–2353 (1989).
32. Models for the Dynamic Optimization of Mineral Processing Plant Performance," J. A. Herbst and K. Rajamani, in *Challenges in Mineral Processing, Proceedings of the Symposium held in Berkeley, California, Dec. 7–9, 1988* (SME of AIME, 1988), pp. 709–739.
33. "A Self–Organizing Controller for Process pH Control," I. Shah and R. K. Rajamani, in *Control '90 — Proceedings of the Symposium held in Salt Lake City, Utah*, eds. (SME of AIME, 1990).
34. "Simulation of Ball Charge Motion in Ball Mills," B. K. Mishra, R. K. Rajamani, and W. G. Pariseau, Preprint number 90–137, SME Annual Meeting, Salt Lake City, February 1990.
35. "Numerical Simulation of Charge Motion in a Ball Mill," B. K. Mishra and R. K. Rajamani, in *7th European Symposium on Comminution Proceedings, Ljubljana, Yugoslavia, June 1990*, eds. (1990).
36. Reviewed Journal, "Motion Analysis in Tumbling Mills by the Discrete Element Method," B. K. Mishra and R. K. Rajamani, KONA Journal of Powder and Particle (8) (1990).
37. Reviewed Journal, "Energy Efficiency of Silicon Carbide Grinding in a Stirred Ball Mill," R. K. Rajamani, in *Proceedings of the World Congress Particle Technology, Part II, Sept. 1990, Kyoto, Japan.* (1990),
38. Reviewed Journal, "Optimal Control of a Ball Mill Grinding Circuit: Part I. Grinding Circuit Modeling and Dynamic Simulation," K. Rajamani and J. A. Herbst, Chemical Engineering Science **46** (3), 861–870 (1991).
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40. Reviewed Journal, "Mathematical Model of the Hydrocyclone Based on Physics of Fluid Flow," K. T. Hsieh and R. K. Rajamani, AICHE Journal **37** (5), 735–746 (1991).

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41. "Self–Organising Control of pH in a Stirred Tank Reactor," Ilesh Shah and R. K. Rajamani, in *Proceedings of the IFAC Workshop on Expert Systems in Mineral and Metal Processing, Helsinki, August 1991*, eds. (1991).
42. Reviewed Journal, "The Leakage Mechanisms in the Hydrocyclone," L. Milin, K. T. Hsieh and R. K. Rajamani, Minerals Engineering **5** (7), 779–794 (1992).
43. Reviewed Journal, "The Discrete Element Method for the Simulation of Ball Mills," B. K. Mishra and R. K. Rajamani, Applied Mathematical Modeling **12** (October) (1992).
44. Reviewed Journal, "Acceleration and Deceleration of Breakage Rates in Ball Mills," Di Guo and R. K. Rajamani, Int. J. Miner. Process. **34**, 103–118 (1992).
45. "Fluid–Flow Model of the Hydrocyclone for Concentrated Slurry Classificaiton," R. K. Rajamani and L. Milin, in *Hydrocyclones Analysis and Applications*, L. Svarovsky and M. T. Thew, eds. (Kluwer Academic Publishers, UK, 1992), pp. 95–108.
46. "Analysis of Media Motion in Industrial Mills," B. K. Mishra and R. K. Rajamani, in *Comminution — Theory and Practice,* S. K. Kawatra, ed. (SME Press, 1992), Chap. 13, p. 427.
47. "Effect of Milling Environment Breakage on the Breakage Rates in Dry and Wet Grinding," R. Verma and R. K. Rajamani, in *Comminution — Theory and Practice,* S. K. Kawatra, ed. (SME Press, 1992), Chap. 19, pp. 261–271.
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49. Reviewed Journal, "Simulation of Charge Motion in Ball Mills. Part 1: Experimental Verifications," B. K. Mishra and R. K. Rajamani, Int. J. Miner. Process. **40**, 171–176 (1994).
50. Reviewed Journal, "Simulation of Charge Motion in Ball Mills. Part 2: Numerical Simulations," B. K. Mishra and R. K. Rajamani, Int. J. Miner. Process. **40**, 187–197 (1994).
51. "Mill Scaleup: Ball Collision Frequency and Collision Energy Density in Laboratory and Pilot–Scale Mills," R. K. Rajamani, S. Agrawala, and B. K. Mishra, in *Proceedings of the XVIII International Mineral Processing Congress Sydney, Australia, Vol. 1*, eds. (1993), pp. 103–107.
52. Reviewed Journal, "Simulation of Charge Motion in Ball Mills — Lifter Bar Effect," B. K. Mishra and R. K. Rajamani, Minerals & Metallurgical Processing Journal (May), 84–90 (1993).
53. "Application of LDV to the Modeling of Particle Size Classification in Industrial Hydrocyclones," __ and R. K. Rajamani, in *AMSE Fluids Engg. Conference, FED–Vol. 191*, eds. (1994), pp. 78–86.
54. Reviewed Journal, "Hydrocyclone Modeling of Swirling Flow and Particle Classification in Large–Scale Hydrocyclones," KONA Powder and Particle Journal (12), 95–104 (1994).
55. "Fluid Mechanics of Slurry Flow through the Grinding Media in Ball Mills," P. K. Songfak and R. K. Rajamani, in *Proceedings of the XIX International Mineral Processing Congress, San Francisco*, eds. (1995), pp. 171–176.
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57. "Dynamics of Ball and Rock Charge in SAG Mills," R. K. Rajamani and B. K. Mishra, in *International Autogenous and Semiautogenous Grinding Technology, Vol. 2,* A. L. Mular, D. J. Barratt, and D. A. Knight, eds. (1996), pp. 700-712.
58. "Ultrafine Grinding in Planetary Ball Mills," R. K. Rajamani, P. Ding, and S. Tillu, in *Proceedings of the Fine Powder Processing Conference, Penn State Campus, Sept. 1997*, eds. (1997).
59. Reviewed Journal, "Kinetics of Alumina Ultrafine Grinding in a Planetary Ball Mill," L. Milin and R. K. Rajamani, Material and Manufacturing Processes **12** (12), 241-260 (1997).
60. "The Modeling of Rock and Ball Charge Motion in SAG Mills," R. K. Rajamani, B. K. Mishra and P. Songfack, in *Comminution Practices,* S. K. Kawatra, ed. (Society for Mining, Metallurgy and Exploration, Inc., 1997), pp. 195-200.
61. Reviewed Journal, "Mechanics of Media Motion in Tumbling Mills with 3D Discrete Elements Method," S. Agrawala, R. K. Rajamani, P. Songfack, and B. K. Mishra, Minerals Engineering **10** (2), 215-227 (1997).

62. "Wet Classification," R. K. Rajamani, revised chapter, in *Perry's Chemical Engineers' Handbook, 7th edition,* R. H. Perry and D. W. Green, eds. (1997), pp. 19-23 to 19-30.

63. Reviewed Journal, "Environment-Dependent Breakage Rates in Ball Milling," R. Verma, R. K. Rajamani, Powder Tech. **84**, 127-137 (1995).

64. Reviewed Journal, "Slurry Transport through the Dynamic Porosity of the Ball Mill," Trans. Indian Inst. Of Metals **50** (5), 337-347 (1997).

65. Reviewed Journal, "The Effect of Bulk Concentration Gradient on Fluid-Solid Reaction Rate," M. Perez-Tello, H. Y. Sohn, and R. K. Rajamani, Chem. Engg. Sci. **54** (1999).

66. Reviewed Journal, "Analysis of Power Draw in Ball Mills by the Discrete Element Method," A. Datta, B. K. Mishra, and R. K. Rajamani, Can. Met. Quart. **38** (2), 133-140 (1999).

67. Reviewed Journal, "Hold-Up Studies in a Pilot Scale Continuous Ball Mill: Dynamic variations due to changes in operating variables," P. Songfack and R. Rajamani, Int. J. Miner. Process. **57**, 105-123 (1999).

68. Reviewed Journal, "Millsoft – Simulation software for tumbling-mill design and trouble shooting," R. K. Rajamani, B. K. Mishra, P. S. Songfack, and R. Venugopal, Mining Engineering Journal (October) (1999).

69. Reviewed Journal, "Dust Collection Performance of a Swirl Air Cleaner," L. A. C. Klujszo, M. Rafaelof, and R. K. Rajamani, Powder Technology **103**, 130-138 (1999).

70. Reviewed Journal, "Computational Fluid Dynamics Model of a Swirler Separator for Gas Cleaning," L. A. C. Klujszo, P. Songfack, M. Rafaelof, and R. K. Rajamani, KONA Powder and Particle, (17) (1999).

71. Reviewed Journal, "A Technical Review of the Proceedings of the '97 Fine Powder Processing Technology Conference," R. K. Rajamani and L. A. C. Klujszo, KONA Powder and Particle (17) (1999).

72. Reviewed Journal, "Discrete Element Analysis of Tumbling Mills," R. K. Rajamani, B. K. Mishra, R. Venugopal, and A. Datta, Powder Technology **109**, 105-112 (2000).

73. Reviewed Journal, "Impact Energy Spectra of Tumbling Mills," R. K. Rajamani, P. Songfack, and B. K. Mishra, Powder Technology **108**, 116-121 (2000).

74. Reviewed Journal, "3D Simulation of Charge Motion in Tumbling Mills by the Discrete Element Method," R. Venugopal and R. K. Rajamani, Powder Technology **115**, 157-166 (2001).

75. "Evolution of the Perfect Simulator," M. Dennis and R. K. Rajamani, in *International Autogenous and Semiautogenous Grinding Technology 2001, Volume IV,* D. J. Barratt, M. J. Allan, and A. L. Mular, eds. (2001), pp. 24-33.

76. "Three Dimensional Simulation of Plant Size SAG Mills," R. K. Rajamani and B. K. Mishra, in *International Autogenous and Semiautogenous Grinding Technology 2001, Volume IV,* D. J. Barratt, M. J. Allan, and A. L. Mular, eds. (2001), pp. 48-57.

77. Reviewed Journal, "Ultrafine Grinding of some Oxides an Non-oxide Materials using the Planetary Mill," Abd El-Rahman, M. K., Ma N., Rajamani, R. K., Cevhar Hazirlama (Mineral Processing), issue no. 5, 11-23 (2001).

78. Reviewed Journal, "A Direct Approach of Modeling Batch Grinding in Ball Mills Using Population Balance Principles and Impact Energy Distribution," R. K. Rajamani, Int. J. Miner. Process. **64**, 181-200 (2002).

79. "Dry Blending to Achieve Isotopic Dilution of Highly Enriched Uranium Oxide Materials," R. N. Henry, N. A. Chipman, and R. K. Rajamani_ (2001).

80. "Nuclear Isotopic Dilution of Highly Enriched Uranium by Dry Blending," R. Henry, N. Chipman, R. K. Rajamani, and J. Malhotra, *Spectrum 2002, Proceedings on CD, August 2002, Reno, Nevada*, eds. (2002).

81. "Mineral Processing Plant/Circuit Simulators: An Overview," J. Herbst, R. K. Rajamani, A. Mular, and B. Flintoff, in *Mineral Processing Plant Design, Practice, and Control Proceedings,* A. L. Mular, D. N. Halbe, and D. J. Barratt, eds. (SME Publications, 2002), pp. 383-403.

82. "___," R. K. Rajamani, S. Latchireddi, V. Devrani, H. Sethia, R. N. Henry, N. A. Chipman, and J. L. Malhotra, in *International High Level Radioactive Waste Management Conference, Proceedings on CD, March 30-April 2, 2003, Las Vegas, Nevada*, eds. (2003).

83. "Two- and Three-Dimensional Simulation of Ball and Rock Charge Motion in Large Tumbling Mills," R. K. Rajamani, B. K. Mishra, A. Joshi, and J. Park, in *Discrete Element Metholds,* B. K. Cook and R. P. Jensen, eds. (American Society of Civil Engineers, Geotechnical Special Publication No. 117: Virginia, 2003[?]).

84. "Simulation of Ball and Rock Charge Motion in Semiautogenous Mills for the Design of Shell and Pulp Lifters," R. K. Rajamani and S. Latchireddi, in *Taller Procesamiento de Minerales Proceedings,* Leonel Gutierrez, ed. (Universidad de Chile, 2003), pp. T12-T27.

85. "Optimizing Performance of Sag Mills – A design approach," S. Latchireddi, R. K. Rajamani, and Travis Orser, in *Proceedings of the Canadian Mineral Processing Congress,* 2005, Ottawa, Canada, _ (eds.) (The Canadian Institute of Mining, Metallurgy and Petroleum: Ottawa, Canada, 2005).

86. "On the Dynamics of Charge Motion in Grinding Mills," R. K. Rajamani, B. K. Mishra, S. Latchireddi, S. Prathy, and T. Patra, in *Proceedings of the Jan D. Miller Symposium,* _ (eds.), Society of Mining & Exploration Engineers, 2005, Salt Lake City, Utah.

87. Reviewed Journal, "A Comparative Study of Three Turbulence-Closure Models for the Hydrocyclone Problem," Jose Delgadillo and Raj K. Rajamani, International Journal of Minerals Processing **77**, 217-230 (2005).

88. Reviewed Journal, "Hydrocyclone Modeling: Large eddy simulation CFD approach," Jose Delgadillo and Raj K. Rajamani, Minerals and Metallurgical Processing Journal **22** (4), 225-232 (2005).

89. "Simulation of Ball and Rock Charge Motion in Semiautogenous Mills for the Design of Shell and Pulp Lifters," Raj K. Rajamani and Sanjeeva Latchireddi, in *Proceedings of the Application of Computers in the Mining Industry 2005,* Tucson, Arizona, _ (eds.) (2006).

90. "Energy Reduction in Semiautogenous Grinding Mills via the Design of Mill Internals," R. Rajamani, S. Latchireddi, and B. K. Mishra, in *Proceedings of the XXIII International Mineral Processing Congress,* Istanbul, Turkey, September 2006 (publisher; city, 2006).

91. "Shell and Pulp Lifter Study at the Cortez Gold Mines SAG Mill," Raj K. Rajamani, Sanjeeva Latchireddi, and Julius Stieger, in *Advances in Comminution,* S. K. Kawatra, ed. (Society for Mining, Metallurgy and Exploration, 2006), 193-204.

92. "Developments in Sensor Technology for Tumbling Mills," Barada K. Mishra, Raj K. Rajamani, Vishal Duriseti, and Sanjeeva Latchireddi, in *Advances in Comminution,* S. K. Kawatra, ed. (Society for Mining, Metallurgy and Exploration, 2006), 527-538.

93. Reviewed Journal, "The Large-Eddy Simulation of Large Hydrocyclones," Jose Delgadillo and Raj K. Rajamani, Particulate Science and Technology Journal, 25[3], 227-246 (2007).

94. Brady G. Butler, Jun Lu, Zhigang Zak Fang, and Raj K. Rajamani, "Production and Characteristics of Nanocrystalline Tungsten Carbide Powder Using a High Energy Dual-Drive Planetary Mill", /Int. J. Powder Metall., /2007, /43(1)/, 35-44.

95. "Sag Mill Operation at Cortez: Evolution of Liner Designs from Current to Future Operations," Julius Stieger, Dave Plummer, Sanjeeva Latchireddi, and Raj K. Rajamani, in 39th *Annual Meeting of the Canadian Mineral Processors Proceedings,* John Folinsbee, ed. (Canadian Institute of Mining, Metallurgy, and Petroleum, 2007), 123-151.

96. "Simulation of Charge Transport in the Pulp Lifter of a Semi Autogenous Grinding Mill," Raj K. Rajamani, in *Proceedings of the Discrete Element Methods 07,* Brisbane, Australia, on CD, Mineral and Physical Processing Section, Breakage subsection [2007].

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100. Tuzcu, E.T., Rajamani, R., Non-linear population balance model in a Batch Ball Mill, 2009 SME Annual Meeting & Exhibit & CMA 111th National Western Mining Conference, Colorado Convention Center, Denver, Colorado, February 22 – 25, 2009.

Publications, cont.

101. "CFD Modeling of dense medium cyclone," R. K. Rajamani, J. Delgadillo, U. B. Kodukula, and D. Alkac, Proceedings of the XVI Coal Preparation Congress, Kentucky, USA, Published by Society of Mining Mineral Exploration Engineers, 2010.

102. Tuzcu E.T, Rajamani R.K, Bharada Mishra. Separation Technologies for Minerals, Coal, and Earth Resources. Edited by Courtney A. Young, Gerald H. Luttrell. USA 2012. pp 695-699.

103. Rajamani R.K, Alkac D., Delgadillo J.A, Kumar P., Page D., Fillion M., Pelletier S., Pulp-Lifter Flow Modeling Study in Pilot Scale Mills and Application to Plant Scale Mills. Proceedings of the International Autogenous Grinding, Semiautogenous Grinding and High Pressure Roll Technology, 2011, Editors: Ken Major, Brian Flintoff, Bern Klein and Kelly McLeod, Vancouver, B.C. Canada.

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PRESENTATIONS

Talks, Seminars, etc.

1. Presentation, "A Three–Component Model for Mineral Liberation during Grinding," International Symposium on Recent Advances in Particulate Science and Technology, December 8–10, 1982, IIT, Madras, India.
2. Seminar, "Modeling and Control of Extractive Metallurgical Processes," Metallurgical Engineering Colloquium, Dept. of Metallurgy, Ohio State University, August 6, 1982.
3. Seminar, "Computer Control of Grinding and Flotation Circuits," Mining and Metallurgy Dept., Virginia Polytechnic Inst. & State University, October, 1983.
4. Presentation, "Evaluation of Mill Speed as a Variable for Grinding Circuit Control," SME of AIME Fall Meeting, Salt Lake City, Utah, December 1983.
5. Graduate Seminar, "Fuzzy Logic Control of Liquid Level Systems," University of California, Berkeley, 1987.
6. Presentation, "Energy Efficiency of Silicon Carbide Grinding in a Stirred Ball Mill," World Congress Particle Technology, Kyoto, Japan, Sept. 1990.
7. Invited Speaker, "Media Motion in Tumbling Mills," Armco Grinding Conference, Vena-delmar, Chile, November 1990.
8. Presentation, "Self–Organizing Control of pH in a Stirred–Tank Reactor," IFAC workshop on Expert Systems in Mineral and Metals Processing, Helsinki, August 1991.
9. Presentation, "Effect of Mill Environment on the Breakage Rates in Dry and Wet Grinding," Comminution Theory and Practice Symposium, SME/AIME Annual Meeting, Feb. 22, 1992, Phoenix, Arizona.
10. Presentation, "Fluid Flow Model of the Hydrocyclone," 4th International Conference on Hydrocyclones, Southampton, UK, September 23–25, 1992.
11. Presentation, "Mass Transport of Slurry in Ball Mills," SME/AIME Annual Meeting, Feb. 15–19, 1993, Reno, Nevada.
12. Invited Speaker, "Discrete Element Method Applied Ball Charge Motion," Queensland Center for Advanced Technology, Brisbane, Australia, May 1993.
13. Invited Speaker, "Modeling of Indusrial Hydrocyclones," International Comminution Research Association, Maroochidore, Australia, May 1993.
14. Presentation, "Mill Scale–Up: Ball Collision Frequency and Collision Energy Density in Laboratory and Pilot–Scale Mills," XVIII International Mineral Processing Congress, Sydney, Australia, May 1993.
15. Presentation, "Dynamics of Ball Charge Motion: Experimental Verification," Mineral Engineering '93 Conference, Capetown, South Africa, August 1993.
16. Presentation, "A Simulator for Autogenous, Semi–Autogenous and Ball Mill Tumbling Loads by DEM," Napa Valley, California, International Comminution Research Association Meeting, October 1995.
17. Presentation, "Fluid Mechanics of Slurry Flow through the Grinding Media in Ball Mills," XIX International Mineral Processing Congress, San Francisco, California, October 1995.
18. Presentation, "A Comprehensive CFD Model of Industrial Hydrocyclones," Hydrocyclone '96, BHRA Conference, Cambridge, England, April 1996.
19. Special Guest Speaker, "The Motion of Charge in Industrial SAG and Ball Mills," VIII Mineral Processing Symposium, Moly-Cop Chile, November 1997.
20. Presentation, "Development of 3D-Millsoft Simulation Software for Tumbling Mills," National Mining Association Board Meeting, St. Louis, Oct. 11, 1999.

INVITED TALKS

1. International Seminar on Mineral Processing Technology and Indo-Korean Workshop on Resource Recycling, Jointly organized by Indian Institute of Mineral Engineers, National Metallurgical Laboratory, and Tata Steel, Chennai, India, March 8-10, 2006, "Improving Energy Efficiency in Semi-Autogenous Grinding Mills."
2. Actas Taller Procesamiento de Minerales, Procemin 2003, Universidad de Chile, Antofagasta, Chile, "Simulation of Ball and Rock Charge Motion in Semiautogenous Mills for the Design of Shell and Pulp Lifters."
3. Classification in Mineral Processing Seminar Series, organized by the Finnish Association of Mining and Metallurgical Engineers, November 23, 2006, Espoo, Finland, "Hydrocyclone Modeling and Design Exploration with CFD Based on Large Eddy Simulation."
4. 2nd Simposio En Engeniera de Minerales, October, 14-16, 2009, Centro de Invetigacion y Estudios de Postgrado, Facultad de Ingenieria, Universidad Autonoma San Luis Potosi, San Luis Potosi, Mexico.

PROFESSIONAL SOCIETY SERVICE

Meeting and Session Organization, etc.

1. Session Co–Chairman, "Modeling in Mineral Processing," SME/AIME Annual Meeting, Los Angeles, February 1984.
2. Session Chairman, "Mathematical Models of Processes," 15th Annual Fine Particle Society Meeting, Orlando, Florida, August 1984.
3. Session Co–Chairman, "Modeling in Mineral Processing," Control 84, SME/AIME Annual Meeting, Los Angeles, February 1984.
4. Session Co–Chairman, "Operating Controls," SME/AIME Fall Meeting, Denver, October, 1984.
5. Session Chairman, "Mathematical Models of Comminution Processes," 15th Annual Fine Particle Society Meeting, Orlando, Florida, August 1984.
6. Session cochairman, "Operating Controls," SME/AIME Annual Meeting, New York, February 1985.
7. Session Co–Chairman, "Population Balance Modeling and Applications," 16th Annual Fine Particle Society Meeting, Miami, April 1985.
8. Session Chairman, "Developments in Advanced Control and Process Optimization," Instrument Society of America, Mining and Metallurgical Division, 13th Annual International Symposium, May 1985.
9. Session Co–Chairman, "Crushing and Grinding," SME/AIME Fall Meeting, Albuquerque, October 1985.
10. Conference Co–Chairman, Recent Advances in Comminution, Engineering Foundation Conferences, Hawaii, December 1985.
11. Session Chairman, "Operating Controls," SME/AIME Annual Meeting, New Orleans, February 1986.
12. Session Chairman, "On–Line Particle Size Analysis," 17th Annual Fine Particle Society Meeting, San Francisco, August 1986.
13. Session Chairman, "Ultrafine Grinding," 18th Annual Fine Particle Society Meeting, Boston, August, 1987.
14. Organizing Committee, the Metallurgical Society of AIME, Fall 1987 Meeting, Mathematical Modelling of Metals and Materials Processing.
15. Session Chairman, "Comminution and Agglomeration," Challenges in Mineral Processing Symposium, Berkeley, California, December 1988.
16. Conference Organizer, "Control of Particulate Processes," Engineering Foundation Conference, Helsinki, Finland, August 1989.
17. Conference Organizer, "Control '90 Mineral and Metallurgical Processing," Society of Mining Engineers of AIME, Salt Lake City, USA, February 1990.

RESEARCH FUNDING & GRANTS

	Source of Funds	Grant Title	Amount	Year
1.	EXXON	"An Integrated Model for Grinding and Flotation Circuit Simulation"	$15,000	1981
2.	Faculty Starter Grant	"Mechanically Assisted Hydrocyclone"	$1000	1982
3.	Mineral Leasing Funds	"Mechanically Assisted Hydrocyclone"	$2280	1982
4.	General Mineral Technology Center	"Phenomenological Modeling of the Hydrocyclone"	$68,746	1982
5.	General Mineral Technology Center	"Hydrocyclone Scale–Up Work on 6– and 10–inch Hydrocyclones"	$33,000	1982
6.	Laboratory Start–Up Equipment Grant	Laboratory equipment and instrumentation	$65,650	1982
7.	General Mineral Technology Center	"Effect of Viscosity Modifiers on the Classification Efficiency of Hydrocyclones"	$38,246	1983
8.	Mineral Leasing Fund	"An Experimental Study to Improve Classification Efficiency of Hydrocyclones"	$3,930	1983
9.	Mineral Leasing Fund	"Coal/Water Mixture Suspension Stability Studies"	$2,650	1984
10.	Mineral Leasing Fund	"Studies on the Transport of Coal/Water Mixture in Pipelines"	$4,595	1984
11.	General Mineral Technology Center	"A Stochastic Model of Continuous Screening Operations"	$32,657	1984
12.	Utah Mining Mineral Resources Research Center	"Optimal Control of Bayer Crystallizer for $Al(OH)_3$ Production"	$13,000	1984
13.	Utah Mining Mineral Resources Research Center	"Optimal Control of Bayer Crystallizer for $Al(OH)_3$ Production"	$13,000	1985
14.	Mineral Leasing Funds	"A Study of the Principal Factors that Influence Recovery of Clean Coal in Coal–Ash Pyrite Flotation System"	$8,300	1985
15.	General Mineral Technology Center	"Phenomenological Modeling of the Hydrocyclone	$39,198	1985
16.	General Mineral Technology Center	"Phenomenological Modeling of the Hydrocyclone	$49,568	1986
17.	General Mineral Technology Center	"Phenomenological Modeling of the Hydrocyclone	$47,517	1987.
18.	General Mineral Technology Center	"Phenomenological Modeling of the Hydrocyclone	$74,004	1988
19.	Mineral Leasing Fund	"Turbulence Intensity Measurements in a Coal Flotation Cell"	$5,000	1986.
20.	DOE	"Carrier Flotation of Coal for Superclean Coal" with Prof. W. B. Hu	$65,000	1986
21.	DOE	"Carrier Flotation of Coal for Superclean Coal" with Prof. W. B. Hu	$65,000	1987

	Source of Funds	Grant Title	Amount	Year
22.	Mineral Leasing Funds	"Expert System for Utah Coal Plants"	$5,000	1987
23.	Rhône Poulenc, Inc.	"Ultrafine Grinding Research" Grant	$48,700	1988
24.	Generic Mineral Technology Center	"Media Mechanics and Breakage in Tumbling Mills"	$55,000	1988
25.	Generic Mineral Technology Center	"Media Mechanics and Breakage in Tumbling Mills"	$20,000	1989
26.	Generic Mineral Technology Center	"Media Mechanics and Breakage in Tumbling Mills"	$34,988	1990
27.	Mineral Leasing Fund	"AI–Based Control of Flotation Cell"	$7,500	1988
28.	Mineral Leasing Fund	"Attrition Milling in Pressurized Chamber"	$8,650	1989
29.	Mineral Leasing Fund	"Coal Cleaning with a New Vortex–Finder Design"	$4,500	1990
30.	Generic Mineral Technology Center	"Wet Grinding–Modeling of Accelerated Breakage of Particles"	$35,784	1989
31.	Generic Mineral Technology Center	"Wet Grinding–Modeling of Accelerated Breakage of Particles"	$46,391	1990
32.	Generic Mineral Technology Center	"Wet Grinding–Modeling of Accelerated Breakage of Particles"	$49,020	1991
33.	Mineral Leasing Fund	"Gas Cleaning Cyclone — Modern Development"	$6,642	1991
34.	Generic Mineral Technology Center	"Industrial Hydrocyclone Design"	$90,000	1990
35.	Generic Mineral Technology Center	"Industrial Hydrocyclone Design"	$70,000	1991
36.	Generic Mineral Technology Center	"Industrial Hydrocyclone Design"	$76,078	1992
37.	Mineral Leasing Fund	"Particulate Emission Study with Gas Cyclones"	$7,860	1992
38.	Aluminium Pecheny, France	"Alumina — Ultrafine Grinding"	$20,000	1992
39.	Generic Mineral Technology Center	"Mass Transport in Wet Overflow Mills"	$59,936	1991
40.	Generic Mineral Technology Center	"Mass Transport in Wet Overflow Mills"	$79,075	1992
41.	Generic Mineral Technology Center	"Mass Transport in Wet Overflow Mills"	$74,497	1993
42.	Coalition to Increase Minority Degrees	"Materials Grinding" — Minority undergraduate student grant	$1,200	1992
43.	Generic Mineral Technology Center	"Ball Mill Scale–Up"	$69,000	1993
44.	Coalition to Increase Minority Degrees	"Laser Velocimetry in Hydrocyclones" — Minority undergraduate student grant	$1,159	1993

	Source of Funds	Grant Title	Amount	Year
45.	Coalition to Increase Minority Degrees	"Ball Mill Grinding" — Minority undergraduate student grant	$1,159	1993
46.	Generic Mineral Technology Center	"Ball Mill Scale–Up"	$54,974	1994
47.	Generic Mineral Technology Center	"Ball Media Motion Computer Code"	$31,969	1994
48.	State Center of Excellence	"Planetary Ball Mill"	$23,000	1995
49.	MJR Scientific Corporation	"Fluid Mechanics of Air Flow Swirlers and Dust Separation"	$56,877	1996
50.	State Center of Excellence	"Planetary Ball Mill and Millsoft Software"	$17,500	1996
51.	University of Utah	"Nanoparticle Production with the Planetary Mill"	$35,000	1998
52.	University of Utah	"Nanoparticle production with the Planetary Mill"	$35,000	1999
53.	INEL/DOE	"3D Millsoft Simulation Software"	$90,000	2000
54.	INEL/DOE	"3D Millsoft Simulation Software"	$71,000	2001
55.	EMPS Research/DOE	"Development of a High-Frequency Eddy Current Separator"	$105,000	2002-04
56.	DOE/NETL	"Nuclear Isotopic Dilution of Highly Enriched Uranium by Blending in RM-2 Mill"	$433,974	2001-03
57.	DOE/NETL	"Improving Energy Efficiency via Optimized SAG Operation"	$383,480	2003-05
58.	DOE/NETL	"Online SAG Mill Grinding Pulse Measurement and Optimization"	$246,253	2004-07
59.	CAST: Center for Advanced Separations Technology	"High Frequency Eddy Current Separation"	$40,000	2003-04
60.	CAST: Center for Advanced Separations Technology	"High Frequency Eddy Current Separation"	$60,000	2004-06
61.	CAST: Center for Advanced Separations Technology	"Novel Design of Dense Medium Cyclones"	$62,981	2006-08
62.	Royalty Income	"Millsoft Simulation Software"	$65,000	2001-10
63.	Poly-Corp Inc., Canada	"Modeling Discharge Flow in Pulp Lifters"	$48,424	2008-10
64.	Kennametal Inc.	"Ultra High Pressure Rapid Hot Consolidation"	$6,000	2007-08
65.	U of U Research Foundation	"Analysis of Semi-autogenous Mills"	$21,000	2007-08

THESES SUPERVISED

1. "Effect of Viscosity Modifiers on the Classification Efficiency of Hydrocyclones," M.S. Thesis, Bruno Deplanque, 1986.
2. "Phenomenological Model of the Hydrocyclone," Ph.D. Dissertation, Kuo–Tai Hsieh, 1988.
3. "Modeling of Wet Batch Milling," M.S. Thesis, Di Guo, 1990.
4. "Hydrocyclone: Investigation of the Fluid–Flow Model," M.S. Thesis, Thierry Monredon, 1990.
5. "Study of Media Mechanics in Tumbling Mill by the Discrete Element Method," Ph.D. Dissertation, Barada K. Mishra, December 1990.
6. "Fuzzy Self–Organizing pH Controller," Ph.D. Dissertation, Ilesh M. Shah, November 1991.
7. "Study of the Environment Dependent Breakage Rates in Batch Grinding," M.S. Thesis, Rohit Verma, December 1992.
8. "Advances in the Fluid Flow Modeling of the Hydrocyclone," M.S. Thesis, Ludovic Milin, February 1993.
9. "Dynamics of Ball Charge Motion," M.S. Thesis, Shardul Agrawala, July 1993.
10. "Mass Transport in Wet Overflow Ball Mills," Ph.D. Dissertation, Polycarpe K. Songfack, 1996.
11. "Modeling of Industrial Hydrocyclones," Ph.D. Dissertation, Balaji Devulapalli, 1991–1996.
12. "Air Core Measurements in Hydrocyclones," M.E. report, Peihong Ding, 1993–1995.
13. "Electrodynamic Separation of Conducting Particles in an Alternating Magnetic Field," MS Thesis, Dongman Kim, 1994-96.
14. "A Three-Dimensional Discrete-Element Code for Cylindrical Tumbling Mills," M.S. Thesis, Ramesh Venugopal, 1998.
15. "Construction and Operation of a Continuous Planetary Mill," M.E. report, Soham Tillu, 1998.
16. "A Model of Batch Grinding with Impact Energy Spectra," Ph.D. Dissertation, Amlan Datta, 1999.
17. "Design of a Swirler Separator," Ph.D. Dissertation, Luis Augusto Colembergue Klujszo, 1998.
18. "Parallelization of Three-Dimensional Millsoft Code," M.S. Thesis, Amol D. Joshi, 2005.
19. "A Planetary Mill Process for Blending and Dilution of Nuclear Oxides, M.S. Thesis, Harappan Sethi, 2005.
20. "Blending and Grinding of Nuclear Oxides," M.S. Thesis, Vikas Devrani, 2005.
21. "Grinding Mill Shell Liner Wear and Its Influence on the Breakage Field," M.S. Thesis, Sravan K. Prathy, 2005.
22. "Modeling of 75- and 250-mm Hydrocyclones and Exploration of Novel Designs Using Computational Fluid Dynamics," Jose Angel Delgadillo Gomez, Ph.D. Dissertation, 2006.
23. "High Frequency Eddy Current Separation of Metallic Granules from Waste Sands and e-Waste," M.S. Thesis, Swadhin Saurabh, 2007.
24. "Influence of Grate and Grate-Pulp Lifter Assembly on the Slurry Hold-Up and Particle Size Distribution," M.S. Thesis, Trilokya Nath Patra, 2007.
25. "An approach for the modeling of grinding mills with ultra fast load cell data and impact energy spectra", Ph.D. Thesis, Emrah Tugcan Tuzcu, December 2009.
26. "Modeling Flow in Pulp Lifter Channels of Grinding Mills with Computational Fluid Dynamics", Ph.D. Thesis, Dilek Alkac, August 2011.