# CURRICULUM VITAE


**Name:** **Jasbir S. Arora** **Title: Professor**

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## Education:

B.Sc., Civil Engineering, Punjab Univ., India, 1964
M.S., Structures, Kansas State Univ., 1967
Ph.D., Mechanics & Hydraulics, The University of Iowa, 1971

## Academic Positions:

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|---|---|---|
| The University of Iowa | F. Wendell Miller Distinguished Professor of Engineering | 2002- |
| The University of Iowa | Director, Optimal Design Lab. | 1984- |
| The University of Iowa | Co-Director, CAE Lab | 1981-1987 |
| The University of Iowa | Professor | 1981- |
| The University of Iowa | Associate Professor | 1976-1981 |
| The University of Iowa | Assistant Professor | 1972-1976 |
| The University of Iowa | Research Associate | 1971-1972 |
| G.N. Eng.. College, India | Assistant Professor | 1964-1965 |
| Korea Advanced Inst. of Science | Short-term Advisor | 7/1975; 8/1983 |

## Research Interests and Experience:

Optimization-Based Digital Human Modeling
Dynamic Response Optimization; Optimal Control of Systems
Design Sensitivity Analysis and Optimization of Nonlinear Systems
Efficient and Robust Optimization Algorithms, Parallel Optimization Algorithms

## Publications:

8 books & monographs (2 authored, 5 co-authored, 1 book edited), 157 journal articles,
25 chapters in books, 100+ conference papers, & 300+ technical reports

## Thesis Supervision:

Ph.D.: 41 (completed), 3 (in progress); M.S.: 12 (completed), 2 (in progress)

## Membership in Professional Societies

1. Member, American Society of Civil Engineers, 1978-2000
2. Fellow, American Society of Civil Engineers, 2000-
3. Senior Member, AIAA (American Institute of Aeronautics and Astronautics), 1983-
4. Member of Sigma Xi
5. Member, American Society of Mechanical Engineers, 1984-2002
6. Fellow, American Society of Mechanical Engineers, 2002-
7. Member, American Academy of Mechanics, 1984-2000
8. Member, Society for Industrial and Applied Mathematics, 1991-93

## Professional Committees at National Level

5. Chair, Analysis & Computation, Technical Administrative Committee, ASCE, 96-2000.
6. Member, Technical Program Committee, 1999 Structures Congress, New Orleans, September 1997-April 1999.
7. Member, Membership Committee, Structural Engineering Institute/ASCE, 1999-
8. Member, Executive Committee, Technical Activities Division, Structural Engineering Institute, American Society of Civil Engineers, 2001-
9. Member, Awards Committee, Technical Activities Division, Structural Engineering Institute, American Society of Civil Engineers, 2005-

## Conference Co-Chair

Fifth Pan American Congress of Applied Mechanics - PACAM V, San Juan, Puerto Rico, January 2-4, 1997

## Conference Chair

13th Analysis and Computation Conference to be held in conjunction with 1998 Structural Engineers World congress, 18-23 July 1998.

14th Analysis and Computation Conference held in conjunction with Structures Congress 2000, Philadelphia, April 2000.

## Keynote/Invited Lectures

10. Panelist on *Optimization Software* (R. J. Eggert, Moderator) at the 1992 National Design Engineering Conference, ASME, McCormick Place, Chicago, IL, February 24-26, 1992.
12. "Structural Optimization: Some Thoughts on Practical Applications," Presented at the OPTI'93 3RD International Conference COMPUTER AIDED OPTIMUM DESIGN OF STRUCTURES, Zaragoza, Spain, July 7-9, 1993.
13. Focused Presentation-5, Optimization in Industry-II Conference, Banff, Canada, June 6-11, 1999.

## Professional Journal Involvement

1. Member Editorial Advisory Board, *Computational Mechanics*, an International Journal, 1985-2000.
2. Senior Advisor, *Structural and Multidisciplinary Optimization*, an International Journal, 1987-
3. Associate Editor, *Journal of Structural Engineering*, ASCE, 7/91-12/95.
4. Member Editorial Board, *Computer Methods in Applied Mechanics and Engineering*, 10/97 – 10/04.
5. Member Editorial Board, *Optimization and Engineering*, Kluwer Academic Publishers, 1/99 - .
6. Member Editorial Board, *International Journal for Numerical Methods in Engineering*, Kluwer Academic Publishers, 11/02 -

## Honors, Prizes, and Awards

1. Awarded B.Sc. Engineering with Honors in 1964, won Punjab Univ. merit scholarship for 1962-63 and 1963-64, won academic prizes for standing first in the class for three years from 1962 to 1964, was also awarded college roll of honors in 1964 and won some prizes in sports also during the undergraduate studies.
2. Old Gold Summer Fellowship, UI, Summer 1978
3. Listed in "American Men and Women of Science: Physical and Biological Sciences," 14th Ed., 1979
4. Listed in Who's Who in America, 44th Ed. 1986; 45th Ed. 1988; 49th Ed. 1994; 56th Ed. 2002

5. Nominated for Tau Beta Pi Teaching Award, 16 March 1993
7. Listed in Who's Who in Technology, 1995
8. THE STATE-OF-THE-ART AWARD, American Society of Civil Engineers, 1998.
9. DISTINGUISHED SERVICE CERTIFICATE, Structural Engineering Institute of the American Society of Civil Engineers, May 2000.
10. THE STATE-OF-THE-ART AWARD, American Society of Civil Engineers, 2004.
11. THE 2004 RESEARCH AWARD, College of Engineering, The University of Iowa, Iowa City, Iowa, 4/2005.
12. The VSR Most Valued Faculty Award, Center for Computer Aided Design, College of Engineering, The University of Iowa, Iowa City, Iowa, 11/2005.

## Service Activities

### Department

33. Member, Promotion and Tenure Committee, 1996-97, 97-98, 98-99, 99-02
34. Member, Curriculum Committee, 1997-
35. Member, Ad Hoc Committee to review Department Chair, November/December 1997
36. Coordinator, Ph.D. Qualifying Exam for SMT, 1997-98, 98-99
37. Member, Faculty Recruitment Search Committee, 1998-99
38. Chair, Promotion and Tenure Committee, 2005-06.

### College

22. Member, Teaching Committee, 1997-98
23. Member, College Promotion and Tenure Committee, 1999 - 2002
24. Elected Member, Engineering Faculty Council, 2000 - 2003
25. Chair, Engineering Faculty Council, 2001-2002
26. Member, CCAD Strategic Planning Committee, 11/2000 –
27. Member, CCAD Review Committee, 2002-03
28. Chair, CCAD Director Search Committee, 1-2/2003

### University

8. Member, Review Committee for the Finance Department, Spring 1994
9. Member, Panel: Introduction to Graduate College, Orientation for New Foreign Students, 12 January 1995
10. Member, Old Gold Fellowship Committee, 1995-96
11. Elected Member, University Faculty Senate, 1996-99

### Community, State, National and International

23. Member, Editorial Board, Computer Methods in Applied Mechanics and Engineering, An International Journal, 10/97 - .
24. Member, Editorial Board, Optimization and Engineering, 1/99 - .
25. Member, Organizing Committee, Optimization in Industry I Conference, Palm Beach, Florida, 1997.
26. Member, Organizing Committee, Optimization in Industry II Conference, Banff, Canada, 1999.
27. Participated in organizing a short course, Application of Optimization in Industry, Hanyang University, Korea, July 4-6, 2001.

## Publications

### *Books and Monographs*

6. Arora, J.S., *Introduction to Optimum Design*, McGraw-Hill Series in Mechanical Engineering,

McGraw-Hill Book Co., New York, N.Y., 1989. (**Translated into Korean and Chinese**).

7. Arora, J.S., Editor, *Guide to Structural Optimization*, ASCE Manuals and Reports on Engineering Practice, No. 90, American Society of Civil Engineering, 1801 Alexander Bell Drive, Reston,VA 20191-4400, 1997. (**Won ASCE Award "State-of-the-Art in Civil Engineering**").
8. Arora, J.S., *Introduction to Optimum Design*, Second Edition, Elsevier Academic Press, San Diego, CA., May 2004 (ISBN 0-12-064155-0)

### *Chapters in Books*

21. Arora, J.S., "Optimization of Structures Subjected to Dynamic Loads", in *Structural Dynamic Systems: Computational Techniques and Optimization*, Vol. 7, C.T. Leondes, Editor, Gordon and Breech Publishers, Newark, NJ, pp. 1-73, **1999**.
22. Kocer, F.Y. and Arora, J.S., "Optimal Design of Transmission Line Structures for Earthquake Loads," in *Case Studies in Optimal Design and Maintenance Planning of Civil Infrastructure Systems*, D.M. Frangopol, Editor, ASCE/SEI Special Publication, pp. 179-190, **1999**.
23. Mijar, A.R. and Arora, J.S., *Elastostatic Frictional Contact Problem Formulation Using Optimization Techniques*, in Optimization in Industry II - 1999, F. Mistree, and A.D. Belegundu (Editors), ASME, New York, pp. 281-296, **2001**.
24. Arora, J.S. and Harasaki, H., "A New Approach for Conceptual Design of Structural Systems," in *Life Cycle Cost Analysis and Design of Civil Infrastructure Systems*, D.M. Frangopol, Editor, ASCE/SEI 1801 Alexander Bell Drive, Reston VA 20191, pp. 48-84, **2001**.
25. Arora, J.S., "Methods for Discrete Variable Structural Optimization," in *Recent Advances in Optimal Structural Design*, edited by Scott Burns, Structural Engineering Institute, ASCE, 1801 Alexander Bell Drive, Reston, VA 20191-4400, pp. 1-40, **2002**.

### *Journal Articles*

134. Mijar, A.R. and Arora, J.S., "Review of Formulations for Elastostatic Frictional Contact Problems," *Structural and Multidisciplinary Optimization*, Vol. 20, No. 3, pp. 167-189, November **2000**.
135. Mijar, A.R. and Arora, J.S., "A Study of Formulations for Elastostatic Frictional Contact Problems," *Archives of Computational Methods in Engineering*, Vol. 7, No. 4, pp. 387-449, **2000**
136. Harasaki, H. and Arora, J.S., "A new class of evolutionary methods for topology design of structures based on the concept of Transferred Force," *Structural and Multidisciplinary Optimization*, Vol. 22, No. 1, pp. 35-56, August **2001**.
137. Silva, M.A., Swan, C.C., Arora, J.S. and Brasil, R., "A New Failure Criterion for RC Members Under Biaxial Bending and Axial Load," *Journal of Structural Engineering*, ASCE, Vol. 127, No. 8, pp. 922-929, August **2001**.
138. Kim, C.H., Mijar, A.R. and Arora, J.S., "Development of simplified models for design and optimization of automotive structures for crashworthiness," *Structural and Multidisciplinary Optimization*, Vol. 22, No. 4, pp. 307-321, November **2001**.
139. Harasaki, H. and Arora, J.S., "New Concepts of Transferred and Potential Transferred Forces in Structures," *Computer Methods in Applied Mechanics and Engineering*, Vol. 191, Nos. 3-5, pp. 385-405, November **2001**.
140. Harasaki, H. and Arora, J.S., "Optimal structural design with indirect use of Transferred Forces," *Structural and Multidisciplinary Optimization*, Vol. 22, No. 5, pp. 384-393, December **2001**.
141. Kocer, F.Y. and Arora, J.S., "Optimal Design of Latticed Towers Subjected to Earthquake Loading," *Journal of Structural Engineering*, ASCE, Vol.128, No. 2, pp. 197-204, **2002**.
142. Harasaki, H. and Arora, J.S., "Topology design based on Transferred and Potential Transferred Forces," *Structural and Multidisciplinary Optimization*, Vol. 23, No. 2, pp. 372-381, June **2002**.
143. Silva, M.A., Arora, J.S., Swan, C.C. and Brasil, R., "Optimization of Elevated Concrete Foundations for Vibrating Machines," *Journal of Structural Engineering*, ASCE, Vol. 128, No. 11, pp 1470-1479, November **2002**.
144. Eriksson, P. and Arora, J.S., "A Comparison of Global Optimization Algorithms Applied to a

Ride Comfort Optimization Problem," *Structural and Multidisciplinary Optimization*, Vol. 24, No. 2, pp. 157-167, September **2002**.

145. Kim, C.H. and Arora, J.S., "Nonlinear dynamic system identification for automotive crash using optimization: a review," *Structural and Multidisciplinary Optimization*, Vol. 25, No.1, pp. 2-18, **2003**.
146. Kim, C.H. and Arora, J.S., "Development of Simplified Dynamic Models Using Optimization: Application to Crushed Tubes," *Computer Methods in Applied Mechanics and Engineering*, Vol. 192, Nos. 16-18, pp. 2073-2097, **2003**.
147. Marler, T. and Arora, J.S., "Survey of Multi-Objective Optimization for Engineering," *Structural and Multidisciplinary Optimization*, Vol. 26, pp. 369-395, **2004**.
148. Mijar, A.R. and Arora, J.S., "An Augmented Lagrangian Optimization Method for Contact Analysis Problems, 1: Formulation and Algorithm," *Structural and Multidisciplinary Optimization*, to appear **2004**.
149. Mijar, A.R. and Arora, J.S., "An Augmented Lagrangian Optimization Method for Contact Analysis Problems, 2: Numerical Evaluation," *Structural and Multidisciplinary Optimization*, to appear **2004**.
150. Kang, B.S., Park, G.J. and Arora, J.S., "Optimization of Flexible Multibody Dynamic Systems Using the Equivalent Static Load Method," *AIAA Journal*, Vol. 43, No.4, pp. 846-852, April **2005**.
151. Arora, J.S. and Wang, Q., "Review of Formulations for Structural and Mechanical System Optimization," *Structural and Multidisciplinary Optimization*, Vol. 30, pp. 251-272, October **2005**.
152. Marler, T. and Arora, J.S., "Function-Transformation Methods for Multi-Objective Optimization," *Engineering Optimization*, Vol. 37, No. 6, pp. 551-570, September **2005**.
153. Mijar, A.R. and Arora, J.S., "An Investigation of Return Mapping Procedure for Frictional Contact Analysis," *Journal of Engineering Mechanics*, ASCE, Vol. 131, No. 10, pp. 1004-1012, October **2005**.
154. Wang, Q. and Arora, J.S., "Alternate Formulations for Transient Dynamic Response Optimization," *AIAA Journal*, Vol. 43, No. 10, pp. 2188-2195, October **2005**.
155. Wang, Q. and Arora, J.S., "Alternative Formulations for Structural Optimization: An Evaluation Using Trusses," *AIAA Journal*, Vol. 43, No. 10, pp. 2202-2209, October **2005**.
156. Kang, B.S., Park, G-J, and Arora, J.S., "A review of optimization of structures subjected to dynamic loads," *Structural and Multidisciplinary Optimization,* to appear, **2005**.
157. Marler, T, Kim, C-H. and Arora, J.S., "System Identification of Simplified Crash Models using Multi-Objective Optimization," *Computer Methods in Applied Mechanics and Engineering,* to appear, **2006**.

### *Conference Publications*

100. Arora, J.S., Kim, C.H. and Mijar, A.R., "Simplified Models for Automotive Crash Simulation and Design Optimization," Proceedings of the *3rd World Congress of Structural and Multidisciplinary Optimization*, SUNY at Buffalo, N.Y., pp. 224-227, May 17-21, **1999**.
101. Arora, J.S. and Mijar, A.R., "Frictional Contact Problem Formulations Using Standard Optimization Techniques," Poster Presentation, *Optimization in Industry - II Conference*, Banff, Canada, June 6-11, **1999**.
102. Arora, J.S., "Methods for Discrete variable Structural Optimization," Proceedings of the *14th Analysis and Computation Conference*, Structures Congress 2000, Philadelphia, PA, May 8-10, **2000**, 8 pages (CD-ROM).
103. Kocer, F.Y. and Arora, J.S., "Optimal Design of Latticed Towers Under Earthquake Loading," Proceedings of the *14th Analysis and Computation Conference*, Structures Congress 2000, Philadelphia, PA, May 8-10, **2000**, 8 pages (CD-ROM).

104. Arora, J.S. and Harasaki, H., "A New Approach for Conceptual Design of Structural Systems," *The First US-Japan Joint Workshop on Life Cycle Cost Analysis and Design of Infrastructure Systems*, Honolulu, August 7-8, **2000**.
105. Mijar, A.R. and Arora, J.S.,"A New Frictional Contact Problem Formulation Using Augmented Lagrangian Formulation," Proceedings of the *42nd AIAA/ASME/ASCE/AHC /ASC Structures, Structural Dynamics and Materials Conference*, Seattle, WA, 16-19 April **2001**.
106. Arora, J.S. and Harasaki, H., "Conceptual Design of Structural Systems Using Transferred Force Principles," Proceedings of *Structures Congress & Exposition*, Washington, D.C., May 21-23, **2001**.
107. Mijar, A.R. and Arora, J.S.,"Time/Load Step Independent Frictional Contact Analysis Using Optimization," Proceedings of the *9th AIAA/ISSMO Symposium on Multidisciplinary Analysis and Optimization (on CD)*, Atlanta, GA, 4-6 September **2002**.
108. Wang, Q. and Arora, J.S., "Alternate Formulations for Structural Optimization," 45th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, April 19-21, **2004**, Palm Springs, CA.
109. Marler, T. and Arora, J.S., "Study of Multi-Objective Optimization Using Simplified Crash Models," *10th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Albany, New York, August 30 – September 1, **2004**.
110. Yang, J., Marler, T. Kim, H-J., Arora, J.S., and Abdel-Malek, K., "Multi-Objective Optimization for Upper Body Posture Prediction," *10th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Albany, New York, August 30 – September 1, **2004**.
111. Yang, J., Marler, T., Farrel, K., Beck, S., Kim, H-J., Abdel-Malek, K., Arora, J.S., and Nebel, K. "Santos: A New Generation of Virtual Humans," *SAE World Congress, Cobo Center, Detroit*, MI, April 11 - 14, **2005**.
112. Wang, Q. and Arora, J.S., "Alternate Formulations for Transient Dynamic Response Optimization," *46th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference/1st MDO Specialist Conference*, April 18-20, **2005**, Austin, TX.
113. Arora, J.S. and Wang, Q.,"Review of Formulations for Structural and Mechanical System Optimization," *6th World Congress on Structural and Multidisciplinary Optimization*, Rio de Janeiro, Brazil 30 May – 3 June **2005**.
114. Silva, M., Arora, J.S. and Brasil, R.M., "Computation of Effective Bending Stiffness of RC Telecommunication Towers," 6th World Congress on Structural and Multidisciplinary Optimization, WCSMO6, Rio de Janeiro, May 29 – June 3, **2005**.
115. Mijar, A. and Arora, J.S., "Frictional Contact Analysis of Continuum Problems Using Augmented Lagrangian Optimization Method," 6th World Congress on Structural and Multidisciplinary Optimization, WCSMO6, Rio de Janeiro, May 29 – June 3, **2005**.
116. Kim, H-J., Horn, E., Arora, J.S. and Abdel-Malek, K., "An Optimization-Based Methodology to Predict Digital Human Gait Motion," *2005 Digital Human Modeling for Design and Engineering Symposium*, SAE International, Iowa City, IA, June 14-16, 2005.
117. Wang, Q., Xiang, Y-J., Kim, J-H., Arora, J.S. and Abdel-Malek, K., "Alternative Formulations for Optimization-Based Digital Human Motion Prediction," *2005 Digital Human Modeling for Design and Engineering Symposium*, SAE International, Iowa City, IA, June 14-16, 2005.
118. Marler, T., Yang, J., Arora, J. and Abdel-Malek, K., "Study of Bi-Criterion Upper Body Posture Prediction Using Pareto Optimal Sets," IASTED Conference, Aruba, August 27-29, **2005**.