



Conference Report

16th ASME Mechanisms Conference

The 16th ASME Mechanisms Conference and the 6th Design Automation Conference were jointly held at the Beverly Hilton Hotel in California from September 29 to October 1, 1980.

A total of 31 technical and panel sessions were organized at the joint conference. The range of topics covered was as follows: kinematics and dynamics of linkages and cam mechanisms; robots and manipulators; computer-aided design of mechanisms and optimization; design of miscellaneous machine elements and systems; case studies involving mechanism applications; and mechanism applications in aerospace industry.

This conference saw a dramatic increase in activity in the kinematics and dynamics of general purpose robots (or manipulators). This activity is expected to increase significantly in future conferences. There were other noticeable changes compared to the recent ASME mechanisms conferences. The number of papers related to planar kinematics has increased; approximately 25 papers dealt with planar kinematic analysis and synthesis. The number of presentations, approximately 38, in the general area of mechanism dynamics also increased significantly. These presentations dealt with mechanisms with rigid or elastic members, balancing, cam dynamics, etc.

A number of presentations (approximately 13) dealt with topics in spatial kinematic analysis and synthesis. Additionally, a significant amount of work in spatial kinematics seems to be directed towards manipulator applications which have already been mentioned.

The work on computer-aided mechanism design and optimization has been a strong feature of the mechanisms conferences for over a decade. The focus on this area was enhanced at this conference due to the cooperative efforts of the Mechanisms Committee and Design Automation Committee.

The mechanism case studies program was once again enthusiastically received. A collection of one-page case reports was published as an ASME pamphlet, fifth in the series, and presented in more detail at the conference. The aim of this program is to bring important industrial applications of mechanisms into the open literature. A special conference program featured applications of mechanisms in aerospace industry.

A number of panel sessions on current topics were organized at the conference. The panel participants were drawn from academic institutions and industry. The discussions focused upon robotics, computer-aided design, optimization, and aerospace systems. Academic and industrial needs and capabilities in these areas and how these areas can benefit from the mechanism field were the main focus of these discussions.

The papers presented at the conference are grouped in the following order according to their subject matter. The panel sessions and their participants are also listed.

Planar Kinematic Analysis

- 1 "Geometrical Analysis of Plane Mechanisms," C. W. Radcliffe, University of California, Berkeley, Calif. (80-DET-110)
- 2* "Linkage Characteristic Polynomials: Definitions, Coefficients by Inspection," H. S. Yan, National Cheng Kung University, Taiwan, Republic of China, and A. S. Hall, Purdue University, West Lafayette, Ind. (80-DET-8)
- 3* "Equations for Four-Bar Line Envelopes," K. H. Hunt, Monash University, Clayton Victoria, Australia, and E. F. Fichter, Oregon State University, Corvallis, Ore. (80-DET-40)
- 4* "A Classification of Coupler-Line Envelopes from Hinged Four-Bar Linkages," J. E. Kimbrell, Westinghouse Electric Corp., Pittsburgh, Pa., and K. H. Hunt, Monash University, Clayton Victoria, Australia (80-DET-42)
- 5 "The Determination of the Kinematic Characteristics of a Mechanism with a Variable Length Connecting Rod," I. Szekeley and F. Sucala, Polytechnical Institute of Cluj-Napoca, Cluj-Napoca, Romania (80-DET-35)
- 6* "Linkage Characteristics Polynomials: Assembly Theorems, Uniqueness," H. S. Yan, National Cheng Kung University, Taiwan, Republic of China, and A. S. Hall, Purdue University, West Lafayette, Ind. (80-DET-9)
- 7* "Kinematic Mapping Part I: Classification of Algebraic Motions in the Plane," S. De Sa, Hewlett Packard, San Diego, Calif., and B. Roth, Stanford University, Stanford, Calif. (80-DET-16)
- 8* "Kinematic Mapping Part II: Rational Algebraic Motions in the Plane," S. De Sa, Hewlett Packard, San Diego, Calif., and B. Roth, Stanford University, Stanford, Calif. (80-DET-17)
- 9 "Analysis of the Double-Link Reverser," D. H. Offner and G. W. Lichti, University of Illinois, Urbana, Ill. (80-DET-2)
- 10* "New Complex-Number Forms of the Euler-Savary Equation in a Computer Oriented Treatment of Planar Path Curvature Theory for Higher-Pair Rolling Contact," G. N. Sandor, and E. Raghavacharyulu, University of Florida, Gainesville, Fla., and A. G. Erdman and L. Hunt, University of Minnesota, Minneapolis, Minn. (80-DET-89)
- 11* "New Complex-Number Forms of the Cubic of Stationary Curvature in a Computer Oriented Treatment of Planar Path-Curvature Theory for Higher-Pair Rolling Contact," G. N. Sandor, and E. Raghavacharyulu, University of Florida, Gainesville, Fla., and A. G. Erdman and L. Hunt, University of Minnesota, Minneapolis, Minn. (80-DET-90)

Planar Kinematic Synthesis

- 1 "Analysis and Synthesis of Multi-Port Lever Mechanism," B. Y. Tsuei, and A. H. Soni, Oklahoma State University, Stillwater, Okla. (pamphlet not available)
- 2 "Synthesis of Sliders for Plane Rigid Body Guidance," C. W. Radcliffe, University of California, Berkeley, Calif. (80-DET-109)
- 3 "Synthesis of the Four-Bar Function Generator, A Novel Approach," C. K. Wojcik, The University of Petroleum and Minerals, Saudi Arabia (80-DET-26)
- 4* "Analysis and Synthesis of Mechanical Error in Geneva Mechanisms - A Stochastic Approach. Part I: External Geneva Mechanism," S. S. Rao, and S. S. Gavane, Indian Institute of Technology, Kanpur, India (80-DET-24)

*To be published in the JOURNAL OF MECHANICAL DESIGN.

- 5* "Analysis and Synthesis of Mechanical Error in Geneva Mechanisms - A Stochastic Approach. Part II: Internal Geneva Mechanism," S. S. Rao, and S. S. Gavane, Indian Institute of Technology, Kanpur, India (80-DET-25)
- 6* "Kinematic Synthesis of an Adjustable Six-Bar Angular-Motion Compensator," L. W. Tsai, General Motors Research Laboratories, Warren, Mich. (80-DET-10)
- 7* "Complex Number Synthesis of Four-Bar Path Generating Mechanisms Adjustable for Multiple Tangential Circular Arcs," L. Huston, Jeep Corporation, Toledo, Ohio, and S. Kramer, University of Toledo, Toledo, Ohio (80-DET-77)
- 8 "Analytical Synthesis of Four-Bar Function Generators to Match Prescribed Differential Coefficients," C. H. Chiang and T. T. Chung, National Taiwan University, Republic of China (80-DET-33)
- 9 "Synthesis of Four-Bar Linkage for Position, Velocity and Acceleration Coordination by Geometric Programming," S. V. Kulkarni and R. A. Kahn, Regional Engineering College, Karukshetra, India (80-DET-80)
- 10 "Synthesis of Two-Degree-of-Freedom Mechanism with Pulse Loading," C. K. C. Jaini and A. C. Rao, Government Engineering College, Jabalpur, India (80-DET-82)
- 11 "Synthesis of Four-Bar Mechanism with Correlation Concept," S. R. Lalpalikar and A. C. Rao, Government Engineering College, Jabalpur, India (80-DET-81)
- 12 "Type and Dimensional Synthesis of Casement Winder Mechanism," A. G. Erdman, E. Nelson, and J. C. Peterson, University of Minnesota, Minneapolis, Minn., and J. Bowen, Truth Inc., Owatonna, Minn. (80-DET-78)
- 13 "Optimum Synthesis of Multi-Loop Planar Mechanisms via the Linear Partition of Design Equations," C. Bagci, Tennessee Technological University, Cookeville, Tenn. (80-DET-1)
- 14* "Implementation of Solution Rectification Techniques in an Interactive Linkage Synthesis Program," J. C. Chuang, University of Houston, Houston, Tex., R. D. Strong, Memphis State University, Memphis, Tenn., and K. J. Waldron, Ohio State University, Columbus, Ohio (80-DET-91)
- 4* "A New Solution to Coulomb Friction in Mechanism Bearing: Theory and Application," I. Imam, General Electric Co., Schenectady, N.Y., M. Skreiner, General Electric Co., Philadelphia, Pa., and J. P. Sadler, University of North Dakota, Grand Forks, N.D. (80-DET-52)
- 5* "Analysis of Drive Shaft Speed Variations in a Scotch Yoke Mechanism," J. L. Wiederrich, FMC Corp., Santa Clara, Calif. (80-DET-92)
- 6 "Machine Unit with Controlled Impulse Progressive Transmission," A. F. Dubrovsky, Polytechnic Institute, Chelyabinsk, U.S.S.R. (80-DET-36)
- 7* "Dynamic Response of an Electric Motor-Linkage System During Start-up," A. Myklebust, Florida Atlantic University, Boca Raton, Fla. (80-DET-54)
- 8 "Role of Induction Driving Motor in Transmission Dynamics," E. I. Rivin, Ford Motor Co., Detroit, Mich. (80-DET-96)
- 9* "The Generalized Coordinate Selection for the Dynamics of Complex Planar Mechanical Systems," R. A. Freeman, Wayne H. Colony Co., Tallahassee, Fla., and D. Tesar, University of Florida, Gainesville, Fla. (80-DET-85)
- 10* "Stress Fluctuations in High Speed Mechanisms," A. T. Yang, G. R. Pennock, University of California, Davis, Calif., and L. M. Hsia, Hughes Aircraft Co., Culver City, Calif. (80-DET-21)
- 11 "Hydraulic Resistance Effects on Hydraulic Elevator," A. Takahashi, S. Shingu, and I. Kosugi, Toshiba Corp., Kawasaki, Japan (80-DET-112)
- 12 "Dynamic Analysis of Variators with Half Ball and Two Discs as Nonholonomic Systems," M. Z. Zlokolic, University of Novi Sad, Veljka Vlahovica, Yugoslavia (80-DET-95)
- 13* "A New Concept for Force Balancing Machines for Planar Linkages. Part I: Theory," S. T. Tricamo, Stevens Institute of Technology, Hoboken, N.J., and G. G. Lowen, The City College of New York, New York, N.Y. (80-DET-73)
- 14* "A New Concept for Force Balancing Machines for Planar Linkages. Part II: Applications to Four Bar Linkages and Experiment," S. T. Tricamo, Stevens Institute of Technology, Hoboken, N.J., and G. G. Lowen, The City College of New York, N.Y. (80-DET-74)
- 15* "Optimum Balancing of Combined Pitching and Yawing Moments in High-Speed Machinery," F. Freudenstein, Columbia University, New York, N.Y., and J. R. Macey and E. R. Maki, General Motors Research Laboratories, Warren, Mich. (80-DET-7)
- 16 "Compilation and Compression of Mathematical Model for a Machine Transmission," E. I. Rivin, Ford Motor Co., Detroit, Mich. (80-DET-104)
- 17* "Complete Shaking Force and Shaking Moment Balancing of Link Mechanisms Using Balancing Idler Loops," C. Bagci, Tennessee Technological University, Cookeville, Tenn. (80-DET-100)
- 18* "On Attempting to Reduce Undesirable Inertial Characteristics of the Schatz Mechanism," J. E. Baker, University of New South Wales, Kensington, Australia, T. Duclong, Comalco Can Co., Yenoora, Australia, and P. S. H. Khoo, Rheem Stralia Ltd., Rydalemore, Australia (80-DET-79)

Spatial Kinematic Analysis and Synthesis

- 1* "An Extension of Screw Theory," M. S. Ohwovoriode, Deere and Company, Moline, Ill., and B. Roth, Stanford University, Stanford, Calif. (80-DET-20)
- 2 "On Linkages and Mobile Polyhedra," J. E. Baker, The University of New South Wales, Kensington, N.S.W. Australia (80-DET-30)
- 3* "The Curvature Theory of Line Trajectories of Spatial Kinematics," J. M. McCarthy, FMC Corp., Santa Clara, Calif., and B. Roth, Stanford University, Stanford, Calif. (80-DET-18)
- 4* "On the Principle of Transference in Three-Dimensional Kinematics," L. M. Hsia, Hughes Aircraft Co., Culver City, Calif., and A. T. Yang, University of California, Davis, Calif. (80-DET-88)
- 5* "Instantaneous Properties of Trajectories Generated by Planar, Spherical and Spatial Rigid Body Motions," J. M. McCarthy, FMC Corp., Santa Clara, Calif., and B. Roth, Stanford University, Stanford, Calif. (80-DET-19)
- 6 "Application of Theory of Conjugate Surfaces in Mechanism Design. Part I: General Concepts," C. H. Chin, Shanghai University of Technology, Shanghai, China (80-DET-29)
- 7* "Instantaneous Kinematics of Multiple-Degree-of-Freedom Motions," J. H. Nayak, San Jose Research Laboratory, San Jose, Calif., and B. Roth, Stanford University, Stanford, Calif. (80-DET-53)
- 8 "Analysis and Synthesis of a Three-Link Linkage with an Intermediate Higher Kinematic Pair," F. L. Litvin, University of Illinois, Chicago, Ill., and Y. I. Gutman, MTS Systems Corp., Minneapolis, Minn. (80-DET-94)
- 9 "3MSP Synthesis of the RCCC Linkage: A Generalized Dual Number Approach," M. A. Beran, IBM Corp., Boulder, Colo., and D. Tesar, University of Florida, Gainesville, Fla. (80-DET-99)
- 10* "A Simple Numerical Method for the Kinematic Analysis of Spatial Mechanism," J. G. de Jalon, M. S. Serna, F. Viadero, and J. Flaquer, Escuela Superior de Ingenieros Industriales, Bilbao, Spain (80-DET-23)
- 11 "Optimum Stochastic Synthesis of Four-Bar Spatial Function Generators," S. B. L. Boehar and A. C. Rao, Government Engineering College Ujjain, India (80-DET-32)
- 12* "A Technique for Kinematic Modeling of Anatomical Joints," H. J. Sommer and N. R. Miller, University of Illinois, Urbana, Ill. (80-DET-84)
- 13* "Reduction of Instrumented Linkage Data for Simple Anatomical Joint Models," G. L. Kinzel, Ohio State University, Columbus, Ohio (80-DET-86)

Dynamics of Machines

- 1* "Connection Force Analysis of Mechanisms Described by Explicit Equations of Motion in Generalized Coordinates," R. R. Allen, University of California, Los Angeles, Calif., and J. P. Harrell, Hughes Aircraft Co., Culver City, Calif. (80-DET-75)
- 2* "Optimization of High Speed Geneva Mechanisms," T. W. Lee, Rutgers University, New Brunswick, N.J. (80-DET-56)
- 3* "Generalized Coordinate Partitioning for Dimension Reduction in Analysis of Constrained Dynamic Systems," R. A. Wehage and E. J. Haug, University of Iowa, Iowa City, Iowa (80-DET-106)

Cam Mechanisms

- 1 "Numerical Scheme for Determining the Pressure Angle and Radius of Curvature of Cams," F. Y. Chen, Ohio University, Athens, Ohio (80-DET-70)
- 2* "Design and Evaluation of Drag-Link Driven Cams," C. W. Kwong, University of Illinois, Chicago, Ill., J. L. Wiederrich, FMC Corp., Santa Clara, Calif., and K. C. Gupta, University of Illinois, Chicago, Ill. (80-DET-38)
- 3* "Residual Vibration Criteria Applied to Multiple Degree of Freedom Cam Followers," J. L. Wiederrich, FMC Corp., Santa Clara, Calif. (80-DET-3)
- 4 "Matrix Methods for Plate Cam Geometry," C. W. Radcliffe, University of California, Berkeley, Calif. (80-DET-111)
- 5* "Analysis and Synthesis of Mechanical Error in Cam-Follower Systems," S. S. Rao and S. S. Gavane, Indian Institute of Technology, Kanpur, India (80-DET-22)
- 6 "Optimum Sensitivity Synthesis of a Cam System Incorporating Manufacturing Tolerances," M. Choubey and A. C. Rao, Government Engineering College, Jabalpur, India (80-DET-31)
- 7* "The Sensitivity Analysis of Cam Mechanism Dynamics," D. S. Young, Brown & Root, Inc., Houston, Tex., and T. E. Shoup, Texas A&M University, College Station, Tex. (80-DET-93)
- 8* "Assessment of the Dynamic Quality of a Class of Dwell-Rise-Dwell Cams," F. Y. Chen, Ohio University, Athens, Ohio (80-DET-83)
- 9 "Self-Conjugate Cam Design for a High-Speed Low-Cost Indexing Mechanism," A. L. Dilpare, Jacksonville University, Jacksonville, Fla. (80-DET-14)
- 10 "The Cam-Link Mechanism: A General Overview and Specific Application to Rigid Body Motion," M. W. Dixon and C. O. Huey, Clemson University, Clemson, S.C. (80-DET-15)
- 11 "Application of B-Spline Functions to the Motion Specification of Cams," M. N. Sanchez and J. G. de Jalon, Escuela Superior de Ingenieros Industriales, Bilbao, Spain (80-DET-28)
- 12* "Kinematic Analysis of Plate Cam Profiles Not Analytically Defined," A. DiBenedetto and A. Vinciguerra, University of Rome, Rome, Italy (80-DET-12)
- 13* "Optimization of Cam Follower Systems with Kinematic and Dynamic Constraints," N. Berzak, Ben Gurion University, Beer-Sheva, Israel (80-DET-11)

Elastic Machine Systems

- 1 "The Finite Element Analysis of Flexible Components of Mechanical Systems Using a Mixed Variational Principle," M. V. Gandhi and B. S. Thompson, Wayne State University, Detroit, Mich. (80-DET-64)
- 2 "The Application of Finite Element Methods to the Dynamic Analysis of Flexible Spatial and Co-Planar Linkage Systems," W. Sunada, Hughes Aircraft Co., Culver City, Calif., and S. Dubowsky, University of California, Los Angeles, Calif. (80-DET-87)
- 3 "Member Initial Curvature Effects of the Elastic Slider Crank Mechanism Response," M. L. Badlani, O'Donnell & Associates, Inc., Pittsburgh, Pa., and A. Midha, Pennsylvania State University, University Park, Pa. (80-DET-72)
- 4 "Kineto-Elastodynamic Analysis of Mechanisms by Finite Element Formulations," G. A. J. Hossne, A. H. Soni, and J. W. Harvey, Oklahoma State University, Stillwater, Okla. (80-DET-103)
- 5 "On Predicting Vibration in Realistically Proportioned Linkage Mechanisms," R. S. Haines, University of Newcastle, Newcastle-upon-Tyne, England (80-DET-4)
- 6 "Planar Polar Stress Elements with Regular and Irregular Joint Freedoms for Mechanical Design," C. Bagci, Tennessee Technological University, Cookeville, Tenn. (80-DET-71)
- 7 "The Finite Element Analysis of Mechanism Components Made from Fiber-Reinforced Composite Materials," B. S. Thompson and M. V. Gandhi, Wayne State University, Detroit, Mich. (80-DET-63)

Robotic Systems (Manipulators)

- 1 "Accessible Region and Synthesis of Robot Arms," Y. C. Tsai and A. H. Soni, Oklahoma State University, Stillwater, Okla. (80-DET-101)
- 2 "The Dextrous Workspace," A. Kumar, University of Wisconsin, Platteville, Wis., and K. J. Waldron, Ohio State University, Columbus, Ohio (80-DET-108)
- 3 "The Workspace of a Mechanical Manipulator," A. Kumar, University of Wisconsin, Platteville, Wis., and K. J. Waldron, Ohio State University, Columbus, Ohio (80-DET-107)
- 4 "The Basic Motion Regulation System for a Quadruped Walking Vehicle," S. Hirose and Y. Umetani, Tokyo Institute of Technology, Tokyo, Japan (80-DET-34)
- 5 "Determination of Extreme Distance of a Robot Hand. Part I: A General Theory," K. Sugimoto, Hitachi, Ltd., Japan, and J. Duffy, University of Florida, Gainesville, Fla. (80-DET-57)
- 6 "Determination of Extreme Distance of a Robot Hand. Part 2: Robot Arms with Special Geometry," K. Sugimoto, Hitachi Ltd., Japan, and J. Duffy, University of Florida, Gainesville, Fla. (80-DET-58)
- 7 "Motion Simulation of an Articulated Robotic Arm Subjected to Static Force," A. G. Patwardhan and A. H. Soni, Oklahoma State University, Stillwater, Okla. (80-DET-102)
- 8 "Dynamic Continuous Path Synthesis of Industrial Robots Using ADAMS Computer Program," N. Orlandea and T. Berenyi, Deere & Company, Moline, Ill. (80-DET-41)

Computer-Aided Design and Optimization

- 1 "MAPS - 1: A Computer-Aided Design System for Preliminary Material and Manufacturing Process Selection," P. Dargie, K. Parmeswar, and W. R. D. Wilson, University of Massachusetts, Amherst, Mass. (80-DET-51)
- 2 "Principles of a Heuristic Optimization Technique as an Aid in Design: An Overview," P. Datsis, University of Rhode Island, Kingston, R.I., (80-DET-44)
- 3 "Monotonicity in Goal and Geometric Programming," P. Papalambros, University of Michigan, Ann Arbor, Mich. (80-DET-48)
- 4 "The Optimization Problem with Optimal Tolerance Assignment and Full Acceptance," M. Waheed and J. N. Siddall, McMaster University, Hamilton, Canada, (80-DET-47)
- 5 "A Rapid Determination of Journal Bearing Characteristics Under Combined Loading," J. Modrey and Y. K. Younes, Purdue University, W. Lafayette, Ind. (80-DET-62)
- 6 "Methods of Optimization for Nonlinear Problems," Y. Gutman, MTS Corp., Minneapolis, Minn. (80-DET-65)
- 7 "Hybrid Computer-Aided Design of A Hydrostatic Vehicle Drive with Energy Accumulation," J. V. Svoboda and S. Sankar, Concordia University, Montreal, Canada, and I. V. Blach, Abteilung fur Elektro, E. T. H., Zurich, Switzerland (80-DET-49)
- 8 "Machining Parameter Optimization for Multistation Synchronous Machines," S. M. Gupta, Northeastern University, Boston, Mass., and M. M. Barash, Purdue University, W. Lafayette, Ind. (80-DET-60)
- 9 "The Balancing of Rotating Shafts by Quadratic Programming," E. Woerner, University of Virginia, Charlottesville, Va. (80-DET-45)
- 10 "Computer-Aided Design of Helical Compression Springs," C. Samonov, Universidad de Guanajuato, Salamanca, GTO, Mexico (80-DET-69)
- 11 "A State Space Method for Kinematic Optimization of Mechanisms and Machines," V. Sohoni and E. J. Haug, University of Iowa, Iowa City, (80-DET-43)
- 12 "Probabilistic Models in Computer Automated Slider-Crank Function Generator Design," G. R. Schade, University of Nebraska, Lincoln, Neb. (80-DET-46)

- 13 "The Simultaneous Analytical Synthesis of Mass and Springs Elements in Planar Mechanisms," J. N. Griffin and G. K. Matthew, University of Florida, Gainesville, Fla. (80-DET-50)
- 14 "MECSYN: An Interactive Computer Graphics System for Mechanism Synthesis by Algebraic Means," O. Silverstein, Norwegian Institute of Technology, Trondheim, Norway, and A. Myklebust, Florida Atlantic University, Boca Raton, Fla. (80-DET-68)
- 15 "Design Sensitivity Analysis of Planar Mechanism and Machine Dynamics," E. J. Haug, R. Wehag, and N. C. Barman, University of Iowa, Iowa City, Iowa (80-DE-6)
- 16 "A Logical Function Method for Dynamic and Design Sensitivity Analysis of Mechanical Systems with Intermittent Motion," P. E. Ehle, U.S. Army, Washington, D.C., and E. J. Haug, University of Iowa, Iowa City, Iowa (80-DET-39)
- 17 "An Interactive Computer Program for Force System Structural and Dimensional Synthesis," W. L. Carson, University of Missouri-Columbia, Columbia, Mo., and O. B. Oladiran, University of Michigan, Ann Arbor, Mich. (80-DET-61)
- 18 "On the Dynamic Simulation of Large Nonlinear Mechanical Systems. Part I: An Overview of Simulation Technique, Substructuring and Frequency Domain Considerations," R. J. Cipra, Purdue University, W. Lafayette, Ind., and J. J. Uicker, University of Wisconsin, Madison, Wis. (80-DET-66)
- 19 "On the Dynamic Simulation of Large Nonlinear Mechanical Systems. Part II: The Time Integration Technique and Time Response Loop," R. J. Cipra, Purdue University, W. Lafayette, Ind., and J. J. Uicker, University of Wisconsin, Madison, Wis. (80-DET-67)

Miscellaneous Machine Elements and Systems

- 1 "Dynamic Behavior of a Moving Belt Supported on Elastic Foundation," R. B. Bhat, G. D. Xistris, and T. S. Sankar, Concordia University, Montreal, Canada (80-DET-55)
- 2 "Finite Element Stress Analysis of Planar Elastic Systems Having Press Fitted Units," C. Bagci and A. A. Smalli, Tennessee Technological University, Cookeville, Tenn., and J. C. Wong, Combustion Engineering, Chattanooga, Tenn. (80-DET-98)
- 3 "Parametric Design Analysis of a Hybrid Composite Flywheel Using a Laminated Central Disk and a Filament Wound Outer Ring," R. P. Nimmer, General Electric Co., Schenectady, N.Y. (80-DET-97)
- 4 "A Generalized Torsion Spring Design Method—A Further Refinement," R. J. Braaten, Linemaster Switch Corp., Woodstock, Conn. (80-DET-5)
- 5 "System Analysis and Structural Criteria Concerning Diesel Locomotives," T. Ionescu, The Institute of Technological Research & Design in Transports, Bucharest, Romania, and N. I. Manolescu, The Polytechnic Institute of Bucharest, Bucharest, Romania (80-DET-105)
- 6 "The Kinematics of Crossed Helical Gears," J. R. Colbourne, University of Alberta, Edmonton, Canada (80-DET-37)
- 7 "The Determination of Lewis Form Factor and the AGMA Geometry Factor J for External Spur Gear Teeth," F. G. Mitchiner and H. H. Mabie, Virginia Polytechnic Institute & State University, Blacksburg, Va., (80-DET-59)
- 8 "Kinematic Correction for Roller Skewing," M. Savage, University of Akron, Akron, Ohio, and S. H. Lowenthal, Tractor Transition Research, Cleveland, Ohio (80-DET-76)
- 9 "Synthesis of an Epicyclic Gear Train for Path Generation," A. C. Rao, Government Engineering College, Jabalpur, India (80-DET-27)

Mechanisms Case Studies

A collection of one-page case reports has been compiled by R. S. Berkof, Gulf & Western Advanced Development and Engineering Center, Swarthmore, Pa. in the ASME pamphlet: Mechanisms Case Studies V, 80-DET-13.

- 1 "Degree of Freedom Analysis to Determine Truck Tail Gate Failure," W. L. Carson, University of Missouri-Columbia, Columbia, Mo.
- 2 "Omni-Directional Triggering Mechanism," A. Zacharin, U.S. Army ARRADCOM, Dover, N.J.
- 3 "Spatial RSSR Mechanism Replaces Complex Alternatives," J. R. Steffen, Valparaiso University, Valparaiso, Ind., and J. F. Lodder, Milton Roy Co., Michigan City, Ind.
- 4 "Exact Inertial Balance of Reciprocating Mass Using Confined Support/Guide-Transfer Mechanism," A. Dilpare, Jacksonville University, Jacksonville, Fla.
- 5 "Synthesis of a Feeding Mechanism (for Solids and Liquids) for Independent Functioning of the Handicapped," C. Bagci, Tennessee Technological University, Cookeville, Tenn.
- 6 "Counter Current Jet Pump," E. M. McWhorter, Citrus Heights, Calif.
- 7 "Synthesis of a Backwash Mechanism," R. Coleman, D. McFee, J. Reuter, and D. Robertus, University of Minnesota, Minneapolis, Minn.

Aerospace Mechanisms

The following presentations are not available as ASME pamphlets. Authors should be contacted directly for abstract and other details.

- 1 "The Vibration Isolating Properties of Squeeze Film Damper Bearings Supporting a Flexible Rotor," R. A. Cookson and S. S. Kossa, Cranfield

- Institute of Technology, Cranfield Bedford, England
- 2 "High Reliability Redundant Mechanisms for a Spaceborne White Light Coronagraph/X-ray XUV Telescope," R. Mastronardi, American Science and Engineering, Inc., Arlington, Mass.
 - 3 "Centroidal Attachment Design for Near-Term Large Space Structures," H. W. Stoll, University of Wisconsin, Platteville, Wis.
 - 4 "Computer Graphics Analysis of Munition Dispersal from Cluster Weapons," J. D. Wurtz, Lockheed Missiles and Space Co., Sunnyvale, Calif.
 - 5 "Application of Symbolic Manipulation to Aerospace Mechanism Dynamics," D. Pollet, Hughes Aircraft Co., Culver City, Calif.

Panel: Future Directions in Robotics

- Moderator: R. E. Gustavson, The Charles Stark Draper Laboratory, Cambridge, Mass.
- Panelists: A. K. Bejczy, Jet Propulsion Laboratory, Pasadena, Calif.
 R. B. McGhee, The Ohio State University, Columbus, Ohio
 R. C. Movich, Lockheed-California Company, Burbank, Calif.
 D. Tesar, University of Florida, Gainesville, Fla.
 V. E. Schienman, Automatix Inc., Burlington, Mass.

Panel: The Place of Mechanism Science in Robotics

- Moderator: K. J. Waldron, The Ohio State University, Columbus, Ohio
- Panelists: S. Dubowsky, University of California, Los Angeles, Calif.
 J. Duffy, University of Florida, Gainesville, Fla.
 B. Roth, Stanford University, Stanford, Calif.
 C. Ruoff, Jr., Jet Propulsion Laboratory, Pasadena, Calif.
 G. H. Sutherland, General Electric Company, Neela Park, Ohio

Panel: Future Trends in Optimization

- Moderator: G. E. Johnson, University of Virginia, Charlottesville, Va.
- Panelists: D. J. Wilde, Stanford University, Stanford, Calif.
 E. J. Haug, University of Iowa, Iowa City, Iowa
 K. M. Ragsdell, Purdue University, W. Lafayette, Ind.
 J. N. Siddall, McMaster University, Hamilton, Canada
 F. Freudenstein, Columbia University, New York, N.Y.

Panel: Computer-Aided Mechanism Design: State-of-the Art

- Moderators: B. Williams, CAD /CAM Systems Division, Arden Hills, Minn.
 B. Paul, University of Pennsylvania, Philadelphia, Pa.
- Panelists: J. Uicker, University of Wisconsin, Madison, Wis.
 M. A. Chace, University of Michigan, Ann Arbor, Mich.
 A. G. Erdman, University of Minnesota, Minneapolis, Minn.

R. E. Kaufman, The George Washington University, Washington, D.C.

Panel: Computer-Aided Mechanism Design: The Users' Viewpoint

- Moderators: R. Maki, General Motors Research Laboratory, Warren, Mich.
 R. Shinkle, SDRC, Milford, Ohio
- Panelists: M. Erdrich, Eastman Kodak, Rochester, N.Y.
 C. R. Kishline, Boeing Commercial Airplanes Co., Seattle, Wash.
 N. Orlandea, The Deere and Company Technology Center, Moline, Ill.
 J. Tachen, Truth Inc., Owatonna, Minn.

Panel: Computer-Aided Mechanism Design: Problems and Needs

- Moderators: A. G. Erdman, University of Minnesota, Minneapolis, Minn.
 K. Waldron, Ohio State University, Columbus, Ohio
- Panelists: J. Uicker, University of Wisconsin, Madison, Wis.
 M. Erdrich, Eastman Kodak, Rochester, N.Y.
 M. A. Chace, University of Michigan, Ann Arbor, Mich.
 C. R. Kishline, Boeing Commercial Airplane Co., Seattle, Wash.
 N. Orlandea, The Deere and Company, Moline, Ill.
 R. E. Kaufman, The George Washington University, Washington, D.C.
 J. Tachen, Truth Inc., Owatonna, Minn.,

Panel: Aerospace Mechanism System Design

- Moderator: D. Pollet, Hughes Aircraft Co., Culver City, Calif.
- Panelists: A. Rosenberg, TRW Systems, Rodondo Beach, Calif.
 D. L. Martin, Douglas Aircraft Co., Long Beach, Calif.
 G. Stanton, Lockheed-California, Burbank, Calif.
 W. G. Smith, Aerospace Corp., El Segundo, Calif.
 D. Sobolic, Sperry, Phoenix, Ariz.
 H. W. Stoll, Wisconsin State University, Platteville, Wis.

Panel: Aerospace Mechanism Component and Subsystem Design

- Moderator: K. Curry, Jet Propulsion Laboratory, Pasadena, Calif.
- Panelists: R. I. Christy, Hughes Aircraft Company, Los Angeles, Calif.
 A. Sabnis, Aerojet ElectroSystems, Azusa, Calif.
 C. J. Starkus, Hughes Aircraft Co., Culver City, Calif.
 E. Devine, Goddard Space Flight Center, Greenbelt, Md.
 P. Jacobsen, Sperry, Phoenix, Ariz.

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