Journal of Sound and Vibration (2001) **244**(1), 21–33
doi:10.1006/jsvi.2000.3455, available online at http://www.idealibrary.com on IDEAL®

IN MEMORIAM A.D. DIMAROGONAS (1938–2000)

T. G. CHONDROS

University of Patras 265 00, *Patras*, *Greece*. *E-mail*: *chondros@mech.upatras.gr*

(*Received* 20 *July* 2000, *and in final form* 29 *September* 2000)

This memorial tribute to the late Professor Andrew D. Dimarogonas is in two parts. The first part is a brief account of his life and his professional career and achievements. The second part is a bibliography of his publications.

1. HIS LIFE AND CAREER

Andrew D. Dimarogonas (1938–2000) was widely recognized as a distinguished authority in various specialities of mechanical engineering. He made important contributions to the mechanical design and vibrations. His last appointment was as W. Palm Professor of Mechanical Design and the Director of the Manufacturing Program in the School of Engineering and Applied Science at Washington University, St. Louis, MO.

Born in Piraeus, Greece, in 1938, he received the Mechanical and Electrical Engineering degree from the Athens National University of Technology (NUT) in 1961, having been awarded a national scholarship. Between 1956 and 1961 he was a union and political activist, elected to leadership positions in local and national student unions and the Youth Division of the United Democratic Left party (EDA).

He served in the Greek Army (1961–1962) in the Technical Corps and was honourably discharged.

After that, he worked in Greek Industry and the Public Power Corporation (PPC) of Greece as a distribution network design engineer, 1962–1967, and was a lecturer at the NUT. By the C and IZ decrees of the military junta he was dismissed in 1967 from the PPC and the NUT together with many other democrats—faculty members or government employees—as dangerous to the "social establishment" of the dictatorship.

He then decided to immigrate to the United States in 1967 and worked for the Turbine Department of the General Electric Company as design engineer and later was promoted to technical leader—dynamics and technical leader—mechanical development of the Large Steam Turbine Division, Schenectady, New York, 1967–1974. He was a consultant in the manufacturing sector since then, dealing with such diverse products as balancing machinery, automotive fuel pumps, intelligent equipment design and non-destructive testing, industrial automation, engine rotor dynamics and the development of a 500-railroad car. In parallel, he was a graduate student at the Rensselaer Polytechnic Institute (RPI) (1968–1970), was awarded a Ph.D. in Mechanical Engineering (ME) in 1970 and was appointed adjunct assistant professor of ME there (1970–1972).

In 1972, he was appointed Associate Professor of Mechanical Engineering at Lehigh University, Bethlehem, Pennsylvania.

In 1974, the junta in Greece fell and he was reinstated to the NUT and PPC retroactively. He was then elected Chaired Professor of Machine Design at the University of Patras (UP)

0022-460X/01/260021 + 13 $35.00/0

in Greece and, subsequently was elected by the faculty as Director, Design Division, Chairman ME, and Dean, School of Engineering at the UP (1974–1983). He also served as national trustee of the Greek Council of Peace, member of the governing board of the Technical Chamber of Greece and chairman of the Mechanical Engineering Accreditation Board. In 1977 he ran (unsuccessfully) for the Greek Parliament in the Patras district.

In 1982, he protested against the Socialist Government University Reform Bill (giving control of the universities to political parties) and stepped down from university administration. Later, he took a sabbatical leave from the UP to become general technical manager of the steel manufacturing company Metallourgiki-Halyps, a Hoesch affiliate (1983–1985), supervising 800 professional and technical employees involved in production, renovation, and computer integration.

In 1986, he returned to the U.S.A. and was appointed W. Palm Professor of Mechanical Design at Washington University in St. Louis, a position he retained until he passed away on April 23, 2000. In 1993, he was appointed Springer Professor of Mechanical Engineering at the University of California, Berkeley for that academic year. In 1999, he was appointed Emeritus Professor at the University of Patras.

He was a Fellow of ASME, and the Society of Design and Process Science, a Professional Engineer in the State of New York and Greece, and author of over 15 books, over 150 research papers and six patents. His design portfolio includes several biomedical devices, a 500-t railroad car, several industrial and institutional facilities, a full line of industrial laundry equipment and several electric power distribution systems. He became founding chairman of the annual International Poetry Symposium (now in its 16th year) and founding editor-in-chief of the Gordon & Breach/Harwood Academic Publishers international journal SYNOPSIS: The Greek Studies Index. His latest research has been in design theory, intelligent manufacturing systems, bioengineering design, engineering diagnosis and prognosis and history of science and engineering.

His books on computer-aided machine design in 1988 and computer programs for mechanical engineers in 1993 won him international acclaim as a leading expert in the field of mechanical design. His books in 1976, 1992 and 1996 on Vibration Engineering and in 1983 on Rotor Dynamics study the behaviour of cracked structural members and rotating machinery. This is a hugely important technological problem for aging turbo-generators, aircraft, and other rotors (generally, built in the 1960s with 30-y operating life spans). Professor Dimarogonas' methodology for monitoring vibrations of these systems permits the diagnosis of the need for correction or replacement. He had tremendous depth of understanding of the physical phenomena involved, of their analytical modelling and also in corroborating techniques of numerical analysis.

In his latest book *Machine Design*: *The CAD Approach* by John Wiley and Sons, Professor Dimarogonas presents the historical evolution of the art of design in a way to put the rules of an axiomatic foundation. The philosophical foundation of knowledge, aesthetics and ethics are discussed in order to identify their implications in engineering design. According to the author the first design theory was part of the aesthetic theory. Beautiful included also functional (useful) and ethical (good) implications. Their development and the relation of the function with the form and the ethical dimension prevails throughout the book, forming the intuitive knowledge required for machine implementation with methods of artificial intelligence. Computer methods in analysis and design are used throughout the book making it a valuable text in the field.

Professor Dimarogonas recently turned his expertise towards biomechanical design and structural fault diagnosis and prognosis, which led to the development of a machine to diagnose osteoporosis using a wide-band sound sweep excitation and a similar machine for non-destructive diagnosis of fatigue of materials before the crack initiation and propagation

stages. He received five patents in this area since 1995. (Several older patents in the areas of turbomachinery and machinery automation were assigned to the sponsoring organizations.)

During his career, a strong interest in history continually manifested itself in chapters of various books, technical papers, lectures, and a particularly notable two-volume history of technology (published in Greek). In his book (co-authored with S. Haddad) *Vibration for Engineers*, his historical sketches of great engineers and scientists include those of Pythagoras, Galileo, Newton, Euler, Gauss, Lagrange, Laplace, Hertz, Stodola, and Timoshenko. Reviews and letters concerning his work on Pythagoras, for example, have appeared in *Scientific American* (July 1990, p. 25), *R&D Magazine* (September 1990, p. 3), *The Chronicle of Higher Education* (May 9, 1990, p. A10), *Science News* (May 12, 1990, p. 295), and *New Scientist* (July 14, 1990, p. 23).

As an engineer–historian, Professor Dimarogonas scrutinized many major scientific libraries in the United States and Europe for source material. He documented that the fundamental axioms of design were discovered during the middle of the last century in Europe and traced the origin of vibration theory to Archimedes and others of that period by unearthing obscure documents in continental libraries. He brought to light certain important historical developments in the field of dynamics and vibrations that were either glossed over or not fully understood.

Andrew D. Dimarogonas received the 1999 ASME Engineer–Historian Award for his many works on integrating the history of mechanical engineering. "He is truly a renaissance man worthy of considerable recognition", noted History and Heritage Committee chair J. Lawrence Lee. His historical research often challenges current claims on innovation today.

He served as a consultant for major corporations, such as General Electric Co., Pratt and Whitney Aircraft, Norca Machinery Corp., Alfa Laval of Sweden and local companies in St. Louis, such as Carter Automotive, Hunter Engineering, Coin Acceptors, Inc., EckAdams Corporation and several law firms on patent disputes and product liability.

He was a frequent author of articles in Greek national daily newspapers, and in English language magazines on political and educational issues, such as *Electrical World*, *Mechanical Engineering News*, *Chronicle of Higher Education*, *Science News*, *Scientific American*, *New Scientist*, *R&D Magazine*, *Business Week*, *Popular Mechanics*, and he presented several well known lectures and keynote addresses on engineering and the arts.

In 1964, he married Catherine, his college-years sweetheart since 1957, who survives him with their two sons: James (Demos) who is a Ph.D. candidate at Washington University and Peter (Panagiotis) who works for the Hyundai Motor Company in Athens, Greece.

2. HIS PUBLICATIONS

BOOKS

A. D. Dimarogonas 1976 *Vibration Engineering*. St Paul: WEST Publishing Company.

A. D. Dimarogonas 1978 *Vibration of Machines and Structures*. Athens: Symmetry Publishers (in Greek).

A. D. Dimarogonas 1979 *Machine Design*. Athens: Symmetry Publishers (in Greek).

A. D. Dimarogonas 1980 *Theory of Machines*. Patras: University of Patras (in Greek).

A. D. Dimarogonas and S. A. Paipetis 1983 *Rotor Dynamics*. London: Elsevier-Applied Science Publishers.

A. D. Dimarogonas 1986 *Art and Technology*. Athens: Symmetry Publishers (in Greek).

A. D. Dimarogonas 1986 *Technology and Politics*. Athens: Symmetry Publishers (in Greek).

A. D. Dimarogonas 1986 *The Misery of Higher Education*. Athens: Symmetry Publishers (in Greek).
A. D. Dimarogonas, N. Aspragathos, T. Chondros, D. Michalopoulos, N. Anifantis, A. Dentsoras, S. Vasilantonopoulos and C. Papadopoulos 1987 *Work Safety in Industry*. Athens. Greek Center for Planning and Economics Research (in Greek).
A. D. Dimarogonas 1988 *Computer Aided Machine Design*. Englewood Cliffs, NJ: Prentice-Hall.
A. D. Dimarogonas 1988 *History of Technology*. Athens: Symmetry Publishers third edition (2 Vols., fourth edition) (in Greek).
A. D. Dimarogonas and S. Haddad 1992 *Vibration for Engineers*. Englewood Cliffs, NJ: Prentice-Hall.
A. D. Dimarogonas 1993 *Computer Programs for Mechanical Engineers*. Englewood Cliffs, NJ: Prentice-Hall.
A. D. Dimarogonas 1996 *Vibration for Engineers*. Upper Saddle River, NJ, Prentice-Hall; second edition.
A. D. Dimarogonas 2001 *Machine Design*: *The CAD Approach* New York: John Wiley & Sons.

DISSERTATION

A. D. Dimarogonas 1970 *An analytic study of the packing rub effect in rotating machinery*. Rensselaer Polytechnic Institute (under Professor George Sandor), Troy, New York, 1970.

JOURNAL PAPERS

N. I. Theophanopoulos and A. D. Dimarogonas 1967 in OECD-*Group of Wear of Engineering Materials*, *Delft*, *Holland*, *TNO*. Wear during sliding: comparison of test methods.
A. D. Dimarogonas and G. N. Sandor 1969 *Wear* **14**, 153–170. Packing-rub effect in rotating machinery.
A. D. Dimarogonas, G. N. Sandor and A. G. Erdman 1971 *Transactions American Society of Mechanical Engineers*, *Journal of Engineering for Industry*. Synthesis of a geared N-bar linkage.
P. S. Kounas, A. D. Dimarogonas and G. N. Sandor 1972 *Wear* **19**, 415–424. The distribution of friction heat between a stationary pin and a rotating cylinder.
A. D. Dimarogonas 1973 *Wear* **23**, 113–119. Heat distribution and flash temperatures in radial seals.
A. D. Dimarogonas 1973 *Wear* **25**, 17–2. Static bow of shafts due to rubbing.
A. D. Dimarogonas 1974 *Wear* **28**, 369–382. A study of the Newkirk effect in turbomachinery.
A. D. Dimarogonas 1974 *Advances in Thermal Conductivity*. University of Missouri-Rolla. The transfer matrix approach to a class of heat conduction problems.
A. D. Dimarogonas 1975 *Ingenieur Archiv* **44**, 9–20. A general method for stability analysis of rotating shafts.
A. D. Dimarogonas 1976 *Advances in Information Sciences*. New York: Hemisphere Publishers Corporation. Hybrid simulation of a linear continuum or a challenge to information sciences.
G. Masouros, A. D. Dimarogonas and K. Lefas 1977 *Wear* **45**, 375–382. A model for surface roughness transients during running-in of bearings.

A. D. Dimarogonas and A. Barman 1977 *Journal of Mechanism and Machine Theory* **12**, 593–603. Free dynamics and stability of the S–S pair of a free-piston engine.
G. Massouros and A. D. Dimarogonas 1979 *SAE Special Publication SAE/SP*-79/448, 67–69. Bearing life expenditure during running-in.
F. E. Andritsos and A. D. Dimarogonas 1980 *American Society of Mechanical Engineers, Journal of Lubrication Technology* **102**, 25–33. Nonlinear pad functions for static analysis of tilting pad bearings.
T. G. Chondros and A. D. Dimarogonas 1980 *Journal of Sound and Vibration* **69**, 531–538. Identification of cracks in complex structures by vibration analysis.
A. D. Dimarogonas 1981 *Journal of Sound and Vibration* **76**, 302–303. Comments on "Identification of cracks in complex structures by vibration analysis".
S. D. Panteliou and A. D. Dimarogonas 1980 *Journal of Sound and Vibration* **73**, 239–245. Heat propagation due to torsional vibration of shafts.
A. D. Dimarogonas and A. Mourikis 1980 *Solar Energy* **25**, 195–199. Synthesis of four bar linkages for solar tracking.
A. D. Dimarogonas 1981 *Mechanical Research Communication* **8**, 179–186. Buckling of rings and tubes with longitudinal cracks.
A. D. Dimarogonas and G. Massouros 1981 *Engineering Fracture Mechanics* **15**, 439–444. Torsional vibration of a shaft with a circumferential crack.
D. Michalopoulos and A. D. Dimarogonas 1981 *Wear* **70**, 303-309. Stick-slip of rotors in fluid bearings at very low speeds.
A. D. Dimarogonas and D. Michalopoulos 1981 *Tribology International* August, 225–229. A compilation of heat distribution parameters at sliding contacts.
N. A. Aspragathos and A. D. Dimarogonas 1982 *IEE Proceedings* **129**, 1–9. Fatigue damage of turbine-generator shafts due to fast reclosing.
S. Panteliou and A. D. Dimarogonas 1982 *American Society of Mechanical Engineers, Journal of Mechanical Design* **104**, 675–678. Heat propagation in rotating shafts due to damping.
N. A. Aspragathos and A. D. Dimarogonas 1982 *Archiv fuer Elektrotechnik Springer-Verlag* **64**, 275–284. Torsional fatigue life reduction in turbogenerators due to large scale disturbances under fast valving control.
S. Panteliou and A. D. Dimarogonas 1982 *International Communications in Heat and Mass Transfer* **10**, 111–122. Heat propagation on a shaft due to transient torsional vibration.
D. Michalopoulos and A. D. Dimarogonas 1982 *Wear* **81**, 135–143. Dynamic behaviour of geared systems with backlash due to stick slip vibratory motion.
S. Panteliou, N. A. Aspragathos and A. D. Dimarogonas 1983 *Ingenieur Archiv* **53**, 173–179. Thermal effects on rotating shafts due to electrical transients causing plastic deformation.
N. Anifantis and A. D. Dimarogonas 1983 *International Journal of Solids and Structures* **19**, 281–291. Stability of columns with a single edge crack to follower and vertical loads.
A. Dentsoras and A. D. Dimarogonas 1983 *Engineering Fracture Mechanics* **17**, 381–386. Resonance controlled fatigue crack propagation.
A. D. Dimarogonas and C. Papadopoulos 1983 *Journal of Sound and Vibration* **91**, 583–593. Cracked shafts in bending.
A. Dentsoras and A. D. Dimarogonas 1983 *International Journal of Fracture* **23**, 15–22. Resonance controlled fatigue crack propagation in a beam under longitudinal vibration.
N. Anifantis and A. D. Dimarogonas 1983 *Engineering Fracture Mechanics* **18**, 693–702. Imperfection post-buckling analysis of cracked columns.

N. Aspragathos and A. D. Dimarogonas 1983 *IEEE Transactions on Power Apparatus and Systems*, **PAS-102**, 1562–1563. (Invited discussion in T. J. Hammonds, Electrical damping and its effect on cumulative fatigue life expenditure of turbine-generator shafts following worst-case supply system disturbances.)

N. Aspragathos and A. D. Dimarogonas 1984 *IEEE Transactions* **PAS-103**, 2308–2317. The effects of some system parameters on the fatigue life reduction of turbine—generator shafts due to electrical transients.

N. Anifantis, and A. D. Dimarogonas 1984 *Computers and Structures* **18**, 351–356. Post buckling behaviour of transverse cracked columns.

A. D. Dimarogonas 1985 *Computer Aided Design* **17**, 363-366. Computerized steam path design.

G. Massouros and A. D. Dimarogonas 1986 *Journal of Sound and Vibration* **106**, 107–118. Modeling of the normal frictional vibration of bearings.

D. Michalopoulos, N. Aspragathos and A. D. Dimarogonas 1986 *Mechanism and Machine Theory* **21**, 145–151. Analytical investigation of a turning gear mechanism during engagement due to stick-slip.

A. D. Dimarogonas 1986 *Journal of Sound and Vibration* **108**, 181–189. Unstable vibration of shafts during machining.

F. Andritsos and A. D. Dimarogonas 1986 *Tribology* **19**, 289–294. Non-linear functions for static and dynamic properties of tilting pad bearings.

C. Papadopoulos and A. D. Dimarogonas 1987 *Journal of Sound and Vibration* **117**, 81–93. Coupled longitudinal and bending vibration of a rotating shaft with an open crack.

A. D. Dimarogonas 1987 *Journal of Sound and Vibration* **225**, 1–6. Modelling damaged structural members for vibration analysis.

D. Michalopoulos, N. A. Aspragathos and A. D. Dimarogonas 1987 *American Society of Mechanical Engineers Journal of Vibration, Acoustics, Stress and Reliability in Design* **109**, 196–200. Fatigue damage of gear teeth in speed reducers moving heavy rotors.

C. Papadopoulos and A. D. Dimarogonas 1987 *Ingenieur Archiv* **57**, 257–266. Coupling of bending and torsional vibration of a cracked Timoshenko shaft.

D. Michalopoulos, N. Aspragathos and A. D. Dimarogonas 1987 *American Society of Mechanical Engineers Journal of Vibration Stress and Reliability in Design* **109**, 196–200. Fatigue damage of gear teeth in speed reducers moving heavy rotors.

A. D. Dimarogonas 1988 *American Society of Lubrication Engineers* (*ASLE*) *Lubrication* **31**, 66–70. Limit cycles of pad bearings under fluid excitation.

K. Nikpur and A. D. Dimarogonas 1988 *Composite Science and Technology* **32**, 209–223. Local compliances of cracked composite bodies.

C. Papadopoulos and A. D. Dimarogonas 1988 *American Society of Mechanical Engineers Journal of Vibration, Acoustics, Stress and Reliability in Design* **110**, 1–8. Coupled vibration of a cracked shaft.

C. Papadopoulos and A. D. Dimarogonas 1988 *American Society of Mechanical Engineers Journal of Vibration, Acoustics, Stress and Reliability in Design* **110**, 356–359. Stability of cracked rotors in the coupled vibration mode.

G. Gounaris and A. D. Dimarogonas 1988 *Computers and Structures* **28**, 309–313. A finite element of a cracked prismatic beam for structural analysis.

S. Panteliou, T. Chondros, G. Bouziotis AND A. D. Dimarogonas 1989 *Solar Energy R&D in the European Community, Solar Collector and Systems Testing Group, Compendium of Contractors*, EUR 11605 EN, 169–185. Reliability of installed hot water solar collectors in Greece.

N. Papaeconomou and A. D. Dimarogonas 1989 *Computational Mechanics* **4**, 130–137. Vibration of cracked beams.

T. G. Chondros and A. D. Dimarogonas 1989 *Journal of Vibration, Acoustics, Stress and Reliability in Design* **111**, 251–256. Dynamic sensitivity of structures to cracks.
A. Dentsoras and A. D. Dimarogonas 1989 *Engineering Fracture Mechanics* **34**, 721–728. Fatigue crack propagation in resonating structures.
G. Nikiforidis, A. Bezerianos and A. D. Dimarogonas 1990 *Journal of Biomechanics* **23**, 323–330. Monitoring of fracture healing with flexural and axial vibration analysis.
P. F. Rizos, N. Aspragathos and A. D. Dimarogonas, 1990 *Journal of Sound and Vibration* **138**, 381–388. Identification of crack location and magnitude in a cantilever beam from the vibration modes.
A. D. Dimarogonas 1990 *Journal of Sound And Vibration* **140**, 181–189. The origins of vibration theory.
A. D. Dimarogonas 1990 *Transactions of the Academy of Athens* **48**, 231–245. The origins of experimental physics.
S. Panteliou, T. G. Chondros, G. Bouziotis and A. D. Dimarogonas 1990 *Solar Energy* **44**, 305–313. Reliability of solar collectors.
G. Gounaris, N. Anifantis and A. D. Dimarogonas 1991 *Engineering Fracture Mechanics* **39**, 931–940. Dynamics of cracked hollow beams.
A. D. Dimarogonas and A. Kollias 1992 *Tribology Transactions* **35**, 611–618. Electrorheological fluid-controlled "smart" bearings.
A. D. Dimarogonas and N. B. Syrimbeis 1992 *Journal of Sound and Vibration* **157**, 467–476. Thermal signatures of vibrating rectangular plates.
C. Papadopoulos and A. D. Dimarogonas 1992 *Journal of Vibration & Acoustics* **114**, 461–467. Coupled vibrations of cracked shafts.
N. Anifantis and A. D. Dimarogonas 1993 *Mechanism and Machine Theory* **28**, 159–164. Flash and bulk temperatures of gear teeth due to friction.
A. D. Dimarogonas, S. H. Abbasi-Jaromi and L. V. Avioli 1993 *Calcified Tissue International* **52**, 244–247. Material damping for monitoring of density and strength of bones.
A. D. Dimarogonas 1992 *Introductory paper to* 40 *Years of Modern Kinematics, a tribute to Ferdinand Freudenstein* (A. Erdman, editor). New York: J. Wiley. The origins of the theory of machines and mechanisms.
A. D. Dimarogonas 1993 *Teploenergetika* **40**, 813–813. Fuzzy input-neural net adaptive expert systems for diagnosis of turbomachinery incipient failures.
A. Kollias and A. D. Dimarogonas 1993 *Journal of Intelligent Material Systems and Structures* **4**, 519–526. Properties of zeolite- and corn-starch-based electrorheological fluids at high shear strain rates.
A. D. Dimarogonas 1993 *Journal of the Acoustical Society of America* **94**, 1891–1892. Acoustic and vibration monitoring of rotating machinery.
A. D. Dimarogonas 1994 *Journal of Sound and Vibration* **169**, 575–576. Remark on the determination of compliance coefficients at the crack section of a uniform beam with circular cross-section.
N. K. Anifantis, R. L. Actis and A. D. Dimarogonas 1994 *Engineering Fracture Mechanics* **49**, 371–379. Vibration of cracked annular plates.
A. D. Dimarogonas and J. C. Gomez-Mancilla 1994 *International Journal of Rotating Machinery* **1**, 37–51. Flow-excited turbine rotor instability.
R. Civitelli, S. H. Abbasi-Jarhomi, L. R. Halstead and A. D. Dimarogonas 1995 *Calcified Tissue International* **56**, 215–219. Ipriflavone improves bone density and biomechanical properties of adult male rat bones.
A. D. Dimarogonas 1995 *Journal of Sound and Vibration* **183**, 739–749. Interval analysis of vibrating systems.

A. D. Dimarogonas 1996 *Journal of Sound and Vibration* **188**, 297–297. Vibration of cracked structures database.
A. D. Dimarogonas 1996 *Engineering Fracture Mechanics* **5**, 831–857. Vibration of cracked structures—a state of the art review.
S. D. Panteliou, A. D. Dimarogonas and I. N. Katz 1996 *Computers and Mathematics* **32**, 51–57. Direct and inverse interpolation for Jacobian elliptic functions, zeta function of Jacobi and complete elliptic integrals of the second kind.
G. D. Gounaris, C. A. Papadopoulos and A. D. Dimarogonas 1996 *Computers and Structures* **58**, 299–305. Crack identification in beams by coupled response measurements.
S. H. Abbasi-Jahromi, A. Matayoshi, R. Kimble, A. Dimarogonas, R. Pacifici 1996 *Journal of Bone Mineral Research* **11**, 594–599. Bone quality factor analysis: A new noninvasive technique for the measurement of bone density and bone strength.
A. D. Dimarogonas 1997 *Journal of Integrated Design and Process Science* **1**, 54–75. Philosophical issues in engineering design.
T. G. Chondros, A. D. Dimarogonas and J. Yao 1997 *Journal of Sound and Vibration* **200**, 303–313. A consistent cracked bar vibration theory.
S. D. Panteliou and A. D. Dimarogonas 1997 *Journal of Sound and Vibration* **201**, 555–565. Thermodynamic damping in porous materials with ellipsoidal cavities.
S. D. Panteliou and A. D. Dimarogonas 1997 *Journal of Shock and Vibration* **4**, 261–268. Thermodynamic damping in porous materials with spherical cavities.
T. G. Chondros and A. D. Dimarogonas 1998 *Journal of Vibration and Acoustics* **120**, 742–746. Vibration of a cracked cantilever beam.
T. G. Chondros, A. D. Dimarogonas and J. Yao 1998 *Journal of Sound and Vibration* **215**, 17–34. A continuous cracked beam vibration theory.
T. G. Chondros, A. D. Dimarogonas and J. Yao 1998 *Engineering Fracture Mechanics Journal* **61**, 503–518. Longitudinal vibration of a bar with a breathing crack.
T. G. Chondros, A. D. Dimarogonas and J. Yao 1998 *Engineering Fracture Mechanics Journal* **61**, 593–601. Longitudinal vibration of a continuous cracked bar.
S. D. Panteliou, H. Abbasi-Jahromi, A. D. Dimarogonas, W. Kohrt and R. Civitelli 1999 *Journal of Biomechanical Engineering* **121**, 423–431. Low-frequency acoustic sweep of bone integrity and osteoporosis.
J. T. Papadimitropoulos, T. G. Chondros, S. D. Panteliou, B. Carlsson, S. Kalogirou and A. D. Dimarogonas 1999 *SAE Technical Paper Series* 1999-01-1154. *Reprinted from Advances in Electric Vehicle Technology* SP-1417. Expert system for energy management of electric cars.
S. D. Panteliou and A. D. Dimarogonas 2000 *Theoretical and Applied Fracture Mechanics* **134**, 217–223. Damping associated with porosity and cracks in solids.
T. G. Chondros, A. D. Dimarogonas and J. Yao 2001 (to appear) *Journal of Sound and Vibration.* Vibration of a beam with a breathing crack.
S. D. Panteliou, T. G. Chondros, V. C. Argyrakis and A. D. Dimarogonas 2001 (to appear) *Journal of Sound and Vibration.* Damping factor as an indicator of crack severity.

CONFERENCE PAPERS OF ANDREW DIMAROGONAS

A. D. Dimarogonas 1971 *GE Optimization Symposium, Schenectady, New York.* OPTIMUM: a general purpose design optimisation routine.
A. D. Dimarogonas 1972 *International Conference on Fluid Machinery, Budapest.* Adiabatic flow between eccentric rotating cylinders.
A. D. Dimarogonas 1973 *Third Panamerican Congress of Marine Engineering and Transportation, Buenos Aires.* Whirl of turborotors at high loads.

A. D. Dimarogonas 1973 13*th International Thermal Conductivity Conference*, *University of Missouri-Rolla*. The transfer matrix approach to a class of heat conduction problems.

A. D. Dimarogonas and G. N. Sandor 1973 *International Conference of Machine Design and Computations*, *Bucharest*. Computer aided design of turbomachinery foundations.

A. D. Dimarogonas 1973 *International Conference of Machine Design and Computations*, *Bucharest*. Nonlinear phenomena of instability of turbine rotors at high loads.

A. D. Dimarogonas 1973 *Third World Congress for the Theory of Machines and Mechanisms*, *Kupari*, *Yugoslavia*, Paper H-9. Optimum design of a multistage thermal machine.

A. D. Dimarogonas and G. N. Sandor 1973 *Third World Congress for the Theory of Machines and Mechanisms*, *Kupari*, *Yugoslavia*, Paper H-10. A general method for analysis of mechanical systems.

A. D. Dimarogonas 1973 *International Gas Turbine Conference*, *Washington DC*, *American Society of Mechanical Engineers Paper* 73-*GT*-26. Newkirk effect: thermally induced dynamic instability of high-speed rotors.

A. D. Dimarogonas and K. Maniatis 1976 64*th World Dental Congress*, *Athens*. Stress analysis of dental restorations by the finite element method.

A. D. Dimarogonas 1977 *American Society of Mechanical Engineers Design Engineering Technical Conference*, *Chicago*, *IL*, *Paper No.* 77-*DET*-113. Flow of friction heat and design temperatures at sliding contacts.

T. G. Chondros and A. D. Dimarogonas 1979 *American Society of Mechanical Engineers Design Engineering Technical Conference*, *St. Louis*, *MO*, *Paper No.* 79-*DET*-106. Identification of cracks in circular plates welded at the contour,

A. D. Dimarogonas and G. Massouros 1979 14 *Jahrestagung der Deutschen Gesellschaft fuer Biomedizinische Technik*, *Hamburg*. Stresses and thermal stresses in dental restorations.

G. Massouros, A. D. Dimarogonas and P. Drakatos 1979 *IMACS Meeting on Simulation of BPS-LSS*, *Patras*. Monitoring change of surface roughness during sliding by means of vibration analysis.

N. Asparagathos and A. D. Dimarogonas 1980 *International Conference on Electrical Machines*, *Athens*. High and low cycle fatigue damage due to electric transients.

A. D. Dimarogonas 1981 *International Conference Engineering Design*, *Rome*. Mechanical design education in Greece.

A. D. Dimarogonas 1981 *International Conference Engineering Design*, *Rome*. Teaching engineering design with group effort on a general theme.

A. D. Dimarogonas 1981 *IMACS Symposium*, *Athens*. Modelling large mechanical systems.

S. Panteliou and A. D. Dimarogonas 1981 *American Society of Mechanical Engineers Winter Annual Meeting*, *Washington DC*, *November* 15–20. *Design Engineering Division*. Heat propagation in rotating shafts due to damping.

A. D. Dimarogonas 1982 *First International Greek Poetry Symposium*, *Patras*. The character of a school of liberal arts in a technological university.

A. D. Dimarogonas 1982 *First National Aircraft Conference*, *Athens*. Crack identification in aircraft structures.

N. Anifantis, N. Aspragathos and A. D. Dimarogonas 1983 *IMEKO*, *Moscow*, *USSR*. Diagnosis of cracks due to earthquakes by vibration response analysis.

N. Anifantis and A. D. Dimarogonas 1983 *American Society of Mechanical Engineers Winter Annual Meeting*, *Boston. Paper WA/ DE*-14. Identification of peripheral cracks in cylindrical shells.

A. Dentsoras and A. D. Dimarogonas 1983 *American Society of Mechanical Engineers Winter Annual Meeting, Boston. Paper WA/DE-26.* Resonance controlled fatigue crack propagation in cylindrical shafts under combined loading.

A. D. Dimarogonas 1984 *Fourth International Conference on Mathematical Modelling, Berkeley. CA.* An algorithm for planar linkage simulation.

A. D. Dimarogonas 1984 *Third International Greek Poetry Symposium, Patras.* Computer spectra and signatures of country and folk songs.

A. D. Dimarogonas 1985 *Applied Mechanics Congress, GUTAM-IUTAM, Athens.* Closed form solutions for the heat conduction equation in the cylinder.

G. Nikiforidis, A. Bezerianos and A. D. Dimarogonas 1986 *IEEE/EMBS Eighth Annual Conference, Fort Worth, TX.* Vibration analysis of fracture healing under plaster cast.

N. Anifantis, P. Rizos and A. D. Dimarogonas 1987 *American Society of Mechanical Engineers 11th Biennial Conference on Mechanical Vibration and Noise, Boston.* Identification of cracks on beams by vibration analysis.

C. Papadopoulos and A. D. Dimarogonas 1987 *American Society of Mechanical Engineers Vibration Conference, Boston.* Stability of cracked rotors in the coupled vibration mode.

C. Papadopoulos and A. D. Dimarogonas 1987 *American Society of Mechanical Engineers Conference, Session on Rotating Machinery Dynamics*, 27–30 September, *Boston, MA.* Coupled longitudinal and bending vibrations of a cracked shaft.

A. D. Dimarogonas 1987 *American Society of Lubrication Engineers Annual Meeting, Annaheim, CA.* Limit cycles of pad bearings under fluid excitation.

S. Panteliou, T. G. Chondros, G. Bouziotis AND A. D. Dimarogonas 1987 *CEC Joint Research Center-Ispra, Italy, Sixth Meeting, Copenhagen.* Reliability analysis of solar DHW systems

A. D. Dimarogonas AND C. Papadopoulos 1988 *Second International Symposium on Transport Phenomena, Dynamics and Design of Rotating Machinery, Honolulu.* Crack detection in turbine rotors.

J. T. Yao and A. D. Dimarogonas 1988 *American Society of Mechanical Engineers Winter Annual Meeting, Paper 88-WA/DSC-42, Chicago.* Vibration of cracked rings.

P. Rizos and A. D. Dimarogonas 1988 *International Federation Automatic Control (IFAC) Symposium, Athens.* Identification of cracks in beams by vibration analysis.

S. Panteliou, T. G. Chondros, G. Bouziotis AND A. D. Dimarogonas 1988 *CEC Joint Research Center-Ispra, Italy, Seventh meeting, Catania.* Reliability of solar collectors.

A. D. Dimarogonas 1988 *Transactions of the Missouri Academy of Sciences* 133-133. A tentative model for the mechanical design process.

R. Actis and A. D. Dimarogonas 1989 *12th Biennial American Society of Mechanical Engineers Conference on Mechanical Vibration and Noise, Montreal*, Vol. DE-18, 99–104. Non-linear effects due to closing cracks in vibrating beams.

C. Papadopoulos and A. D. Dimarogonas 1989 *12th Biennial American Society of Mechanical Engineers Conference on Mechanical Vibration and Noise, Montreal*, DE-18, 7–13. Coupled vibration of cracked shafts.

A. D. Dimarogonas and A. Kollias 1989 *Annual Meeting, Society of Tribology and Lubrication Engineers.* Electrorheological fluid smart bearings.

A. D. Dimarogonas 1990 *Third IFToMM International Rotor Dynamics Symposium, Lyon, France.* Smart rotors.

A. D. Dimarogonas 1990 *Third Turbomachinery Symposium, Honolulu.* Whirl of turborotors at high loads.

A. D. Dimarogonas and C. Papadopoulos 1990 *Fourth EPRI Incipient Failures Conference, Philadelphia, PA.* Diagnosis of edge cracks in rotating shafts.

A. D. Dimarogonas 1991 *Introductory Paper to the* 40 *Years of Modern Kinematics, a Tribute to Ferdinand Freudenstein Conference, Minneapolis*. The origins of the theory of machines and mechanisms.

A. D. Dimarogonas, A. Kollias and E. Tozakoglou 1992 *International Conference of Transport Processes in Manufacturing, Honolulu*. Electromagnetic stirring in the continuous casting of non-ferrous metals.

A. D. Dimarogonas 1992 *ISROMAC*-4, *Honolulu*. A fuzzy-input, neural network expert system for diagnosis of incipient failures in turbomachinery.

A. D. Dimarogonas 1992 *ISROMAC*-4, *Honolulu*. Bilinear analysis of closing cracks in rotating shafts.

A. D. Dimarogonas and A. Kollias 1992 *Third Rotordynamics* '92, *Venice*. Berlin: *Springer-verlag*. Smart rotors, electrorheological bearing control.

J. Gomez-Mancilla and A. D. Dimarogonas 1992 *Rotordynamics* '92, *Venice*. Berlin: *Springer–Verlag*. Limit and chaotic cycles of rotors due to flow-induced instability.

A. D. Dimarogonas 1992 *Rotordynamics* '92, *Venice*. Berlin: *Springer-Verlag*. EXPERTS: a fuzzy-input, neural network expert system shell for rotor diagnosis.

A. D. Dimarogonas 1992 *Rotordynamics* '92, *Venice*. Berlin: *Springer-Verlag*. *Keynote Address*. A brief history of rotor dynamics.

A. Kollias and A. D. Dimarogonas 1992 *Conference on Recent Advances in Adaptive and Sensory Materials and their Applications. Proceedings*, 548–558. *Blacksburg, VA*: *Technomics Publishers*. Rheology of zeolite and starch-based ER fluids at high shear strain rates.

A. D. Dimarogonas 1992 *Mechanism Conference, Proceedings American Society of Mechanical Engineers, Mechanism Design and Synthesis*, Vol. DE-46, 229–234. Mechanisms of the ancient Greek theatre.

A. Kollias and A. D. Dimarogonas 1992 *Third International Conference on Adaptive Structures, San Diego, CA*. Damping of rotor vibration using electrorheological fluids.

A. D. Dimarogonas and A. Kollias 1993 *Second Latino-American Turbomachinery Conference, Cuernavaca, Mexico*. A "smart" electrorheological fluid rotor vibration absorber.

A. D. Dimarogonas 1993 *Second Latino-American Turbomachinery Conference, Cuernavaca, Mexico*. Interval analysis of an artificial neural network for diagnosis of turbomachinery incipient failures.

A. D. Dimarogonas 1993 12th *Southern Biomedical Conference, New Orleans, Proceedings*, 260–263. Early diagnosis of incipient failures of the Bjoerk–Shiley heart valves.

A. D. Dimarogonas and K. Nakamura 1993 *Japanese Society of Mechanical Engineers and American Society of Mechanical Engineers Joint Workshop on Design-Frontiers in Engineering Design-, Tokyo, Proceedings*, 208–236. Intelligent design of gear trains.

A. D. Dimarogonas 1993 126*th Meeting of the Acoustical Society of America, Denver, CO. Plenary Paper*. Acoustic and vibration monitoring of rotating machinery.

A. D. Dimarogonas 1993 *American Society of Mechanical Engineers Design Engineering Conferences, Albuquerque, NM. Vibrations of Mechanical Systems and the History of Mechanical Design* **DE-63**, 1–18. The origins of engineering design.

A. D. Dimarogonas 1993 *American Society of Mechanical Engineers Design Engineering Conferences, Albuquerque, NM. Design Theory and Methodology* **DE-53**, 253–258. On the axiomatic foundation of design.

A. D. Dimarogonas 1993 *American Society of Mechanical Engineers Design Engineering Conferences, Albuquerque, NM. Vibrations of Mechanical Systems and the History of Mechanical Design* **DE-63**, 89–95. Interval analysis of vibrating systems.

A. D. Dimarogonas 1993 *American Society of Mechanical Engineers Design Engineering Conferences*, *Albuquerque*, *NM*. *Vibration Shock Damage and Identification of Mechanical Systems* **DE-64**, 47–54. Interval analysis of neural net adaptive expert systems for diagnosis of machinery incipient failures.

A. Kollias and A. D. Dimarogonas 1993 *American Society of Mechanical Engineers Design Engineering Conferences*, *Albuquerque*, *NM*. *Intelligent Structures Materials and Vibrations* **DE-58**, 7-15. A "smart" electrorheological fluid dynamic vibration absorber.

J. C. Gomez-Mancilla and A. D. Dimarogonas 1993 *American Society of Mechanical Engineers Design Engineering Conferences*, *Albuquerque*, *NM*. *Nonlinear Vibrations* **DE-54**, 155–160. On the behaviour of steam whirl and nonlinear rotor-bearing systems.

T. G. Chondros, S. Michalitsis, S. Panteliou and A. D. Dimarogonas 1994 *Society of Automotive Engineers International Congress and Exposition*, *Detroit*, *MI*. *Special Publication SP*-1023, 5–12. Chassis design for a small electric city car.

A. D. Dimarogonas 1994 *Second International Sound and Vibration Conference*, *Beijing*, *China*. *Opening Address*. New York: *Proceedings*, 745–752 *Academic Publishers*. Vibration of cracked structures.

A. D. Dimarogonas 1994 *Second International Sound and Vibration Conference*, *Beijing*, *China*. *Proceedings*, 745–752. New York: Academic Publishers. Interval rotor dynamics.

A. Kollias and A. D. Dimarogonas 1994 *American Society of Mechanical Engineers WAM*, *Chicago*. Electrorheological fluid flow in partial journal bearings.

S. Panteliou, H. Abbasi-Jahromi and A. D. Dimarogonas 1995 14*th Southern Bioengineering Conference*, *Shreveport*, *LA*. The acoustic sweep method for monitoring osteoporosis.

S. Panteliou, H. Abbasi-Jahromi and A. D. Dimarogonas 1995 *American Society of Mechanical Engineers Winter Annual Meeting*, *San Francisco*, *CA*. The monitoring of osteoporosis by vibration response analysis.

A. D. Dimarogonas 1995 *American Society of Mechanical Engineers Summer Meeting*, *Los Angeles*, *CA*. *Impact*, *Waves*, *and Fracture Symposium*, 35–42. Impact engineering and the Persian wars.

S. D. Panteliou and A. D. Dimarogonas 1996 *Second National Congress on Computational Mechanics*, *Chania*, *Creta*, *Greece*. A thermodynamic method for determination of damping of porous structures and monitoring of osteoporosis.

T. G. Chondros, A. D. Dimarogonas and J. Yao 1997 *American Society of Mechanical Engineers Design Engineering Technical Conferences DETC* '97, *Sacramento*, *CA*. Vibration of a continuous cracked beam

T. G. Chondros, P. A. Belokas, K. Vamvakeros and A. D. Dimarogonas 1997 *SAE International Congress and Exposition*, *Detroit*, *MI*, *Steering and Suspensions Technology SP*-1223, 169–180. Vehicle dynamics simulation and suspension system design.

T. G. Chondros, S. D. Panteliou, D. Dokos, S. Krouskas and A. D. Dimarogonas 1997 30*th ISATA Conference*, *Paper No*. 97*AE*03, *Florence*, *Italy*. Computer aided design and control by an expert system of drive trains for electric cars.

A. D. Dimarogonas and T. G. Chondros, 1997 *First International Conference of the Society for the Study of Ancient Greek Technology*, *Salonica*, *Greece*. Deus Ex Machina.

T. G. Chondros, S. D. Panteliou, S. Pipano, D. Vergos, P. Dimarogonas, D. Spanos and A. D. Dimarogonas 1998 *SAE International Congress and Exposition*, *Detroit*, *MI*, *Technology for Electric and Hybrid Vehicles SP*-1331, 43–51. Styling for a small electric city car.

J. T. Papadimitropoulos, T. G. Chondros, S. D. Panteliou, B. Carlsson, S. Kalogirou and A. D. Dimarogonas 1999 *SAE International Congress and Exposition*, *Detroit*, *MI*, *Advances in Electric Vehicle Technology SP*-1417. Expert system for energy management of electric cars

S. D. Panteliou and A. D Dimarogonas 2000 *Mechanics* 2000, *International Conference on Role of Mesomechanics for the Development of Science and Technology. Xi'an, China.* Damping associated with porosity and crack in solid.

RECENT PATENTS OF ANDREW DIMAROGONAS

Dimargonas' work in Biomechanical Design and Diagnosis and Prognosis has led to the development of a machine to diagnose osteoporosis using a wide-band sound sweep excitation and a similar machine for non-destructive diagnosis of fatigue of materials before the crack initiation and propagation stages. Several older patents in the areas of turbomachinery and machinery automation were assigned to the sponsoring organizations.

A. D. Dimarogonas 1995 *U.S. Patent No* 5,402,781, April 4. Method and apparatus for determining bone density and diagnosing osteoporosis. International Patents issued or pending

A. D. Dimarogonas 1995 *U.S. Patent No* 5,476,009, December 19. Method and apparatus for determining material fatigue by measuring damping factors. International Patents issued or pending.

A. D. Dimarogonas 1997 *Patent No* 5,652,386, June 7. Method and apparatus for predicting structural integrity byestimating modal damping factor. International Patents pending.

A. D. Dimarogonas 1997 *Patent No* 5,614,674, June 7. Method and apparatus for predicting fatigue by introducing acontinuous excitation to determine damping factor. International Patents pending

ACKNOWLEDGMENTS

Professor P. E. Doak and Mrs J. Halliday read the manuscript and suggested improvements to the text. Their contribution is gratefully acknowledged.