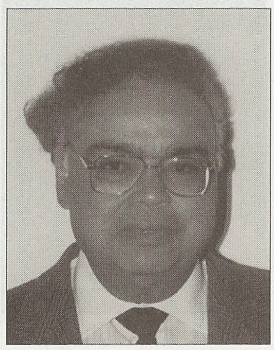
2001 Microwave Pioneer Award

Om P. Gandhi

The Microwave Pioneer Award recognizes an individual or a team not exceeding three persons having made outstanding pioneering technical contributions that advance microwave theory and techniques and described in an archival paper published at least 20 years prior to the year of the award. This year's recipient is Prof. Om P. Gandhi, whose citation reads: "**For contributions to dosimetry of electromagnetic radiation and resulting revisions of RF/microwave safety standards**."


Om Ghandi

Om Gandhi has been a faculty member in the Department of Electrical Engineering at the University of Utah, Salt Lake City, Utah since 1967 where he has been a professor since 1973. He also served as the Department Chairman from 1992-2000. He received his B.S. (Honors) degree in Physics from the University of Delhi, India, Post-graduate Diploma of the Indian Institute of Science, Bangalore, and M.S.E. and Sc.D. degrees in Electrical Engineering from the University of Michigan, Ann Arbor. During his professional career, he has also worked at Philco-Ford Research Laboratory, Blue Bell, PA 1960-1962 and at Central Electronics Engineering Research Laboratory, Pilani, India from 1962-1966.At the University of Utah, Gandhi worked initially on crossed-field microwave tubes and semiconductor plasmas before entering the field of bioelectromagnetics. His entry into the latter field was a result of spending the autumn quarter 1973 consulting at the Walter Reed Army Institute of Research, Washington D.C. Experimental measurements of frequency-dependent absorption of RF by anesthetized rats and lossy prolate spheres of various size led Gandhi to postulate conditions of maximum absorption by man and animals — work that was presented at the MTT-S Symposium in Palo Alto, CA, May 12-14, 1975 and published that same year as the following paper, O. P. Gandhi, "Conditions of Strongest Electromagnetic Power Deposition in Man and Animals,"*IEEE Trans. MTT*, Vol. 23, pp. 1021-1029, 1975.

A contribution of this paper was to show that the absorption cross section of the human body at "resonance" is higher by a factor of 8-10 than expected previously and can be four or more times the physical cross section of the body. This work led to a downward revision of the ANSI/IEEE RF/Microwave safety guidelines (ANSI C95.1-1982) and subsequently by IRPA of World Health Organization (1984) and by Standards Committees in Germany (1984), Australia (1985), Canada (1987), U.K. (1989) and Japan (1990).

Gandhi is the author of the textbook, Microwave Engineering and Applications published by Pergamon Press (1981), author or co-author of several book chapters, and over 200 journal articles on electromagnetic dosimetry, microwave tubes, and solid-state devices. He also edited the book, *Biological Effects and Medical Applications of Electromagnetic Energy* (Prentice-Hall, 1990), and co edited the book *Electromagnetic Biointeraction* (Plenum Press, 1989).

For the last 25 years, Professor Gandhi and his students have worked in developing anatomically-based models of the human body (present resolutions on the order of 1-3 mm) and numerical electromagnetic techniques that are being used to understand coupling of EM fields for far- and near-field exposures from ELF to microwave frequencies. Since all of the current safety standards in the U.S. and elsewhere are set in terms of the internal rates of EM energy deposition, these techniques have been used for compliance testing of electromagnetic devices from cellular telephones to electronic article surveillance systems. His present interests are inversion algorithms based on these techniques for medical diagnostics and design of noninvasive applicators for biomedical application.

Dr. Gandhi was elected a Fellow of the IEEE in 1979 and received the Distinguished Research Award from the University of Utah for 1979-1980. He has been President of the Bioelectromagnetics Society (1992-1993), Cochairman of IEEE SCC 28.IV Subcommittee on the RF Safety Standards (1988-1997), and Chairman of the IEEE Committee on Man and Radiation (COMAR) (1980-1982). In 1995, he received the d'Arsonval Medal of the Bioelectromagnetics Society for pioneering contributions to the field of bioelectromagnetics.