LATIN AMERICAN APPLIED RESEARCH

SPECIAL THEME ISSUE

Bifurcation Control:

Methodologies and Applications

Edited by

**Mario di Bernardo[1],
Guanrong Chen[2],
Jorge L. Moiola[3]**

In honour to the 65th Anniversary of Professor Leon O. Chua

[1] Dept. of Engineering Mathematics, University of Bristol, Bristol, United Kingdom.
[2] Dept. of Electronic Engineering, City University of Hong Kong, Kowloon, Hong Kong, China.
[3] Dto. de Ingeniería Eléctrica, Universidad Nacional del Sur, Bahía Blanca, Argentina.

LEON O. CHUA

Leon O. Chua was born in the Philippines on June 28, 1936. He is currently a Professor of electrical engineering and computer sciences at the University of California, Berkeley. He received the B.S.E.E. degree from Mapua Institute of Technology, Manila, the Philippines, the S.M. degree from Massachusetts Institute of Technology, Cambridge, in 1961, and the Ph.D. degree from the University of Illinois, Urbana, in 1964. His research interests are in the areas of nonlinear dynamics, artificial intelligence and complexity theory. He has been consultant to various electronic industries in the areas of nonlinear network analysis, modeling and computer aided design. He is the author of *Introduction to Nonlinear Network Theory* (New York: McGraw-Hill, 1969) and *CNN: A Paradigm for Complexity* (Singapore: World Scientific, 1998), and a coauthor of the books *Computer Aided Analysis of Electronic Circuits: Algorithms and Computational Techniques* (Englewood Cliffs, NJ: Prentice Hall, 1975), *Linear and Nonlinear Circuits* (New York: McGraw-Hill, 1987), *Practical Numerical Algorithms for Chaotic Systems* (New York: Springer-Verlag, 1989), and *Methods of Qualitative Theory of Nonlinear Dynamics* (Singapore: World Scientific, 1998). He has published many papers in the area of nonlinear networks and systems. He served as Editor of the *IEEE Transactions on Circuits and Systems* from 1973 to 1975, elected as an IEEE Fellow in 1974 and as a President of the IEEE Circuits and Systems Society in 1976. He is presently the Editor of the *International Journal of Bifurcation and Chaos* and a Deputy Editor of the *International Journal of Circuit Theory and Applications*.

Professor Chua is the holder of seven U.S. patents. He is also the recipient of several awards and prizes, including the 1967 IEEE Browder J. Thompson Memorial Prize Award, the 1973 IEEE W. R. G. Baker Prize Award, the 1974 Frederick Emmons Terman Award, the 1976 Miller Research Professorship, the 1982 Senior Visiting Fellowship at Cambridge University, the 1982/83 Alexander von Humboldt Senior U.S. Scientist Award at the Technical University of Munich, the 1983/84 Visiting U.S. Scientist Award at Waseda University, Tokyo, the IEEE Centennial Medal in 1985, the 1985 Myril B. Reed Best Paper Prize, the 1985 and 1989 IEEE Guillemin-Cauer Prizes, the 1995 M. E. Van Valkenburg Award, the 2000 IEEE Circuits and Systems Society Golden Jubilee Medal, the 2000 IEEE Third Millennium Medal, and the 2000 IEEE Neural Networks Pioneer Award. In 1986, he received a *Professor Invité* International Award at the University of Paris-Sud from the French Ministry of Education. He was also conferred a *Doctor Honoris Causa* from the Ecolé Polytechnique Fédérale-Lausanne, Switzerland, in 1983, and Honorary Doctorate from the University of Tokushima, Japan, in 1984, and Honorary Doctorate from the Technische Universität Dresden, Germany, in 1992, a *Doctor Honoris Causa* from the Technical University of Budapest, Hungary, in 1994, a *Doctor Honoris Causa* from the University of Santiago de Compostela, Spain, in 1995, a *Doctor Honoris Causa* from the University of Frankfurt, Germany, in 1996, a *Doctor Honoris Causa* from the Technical University of Iasa, Romania, in 1997 and a *Doctor Honoris Causa* from the University of Catania, Italy, in 2000. He was elected a foreign member of the European Academy of Sciences (Academia Europaea) in 1997.

EDITORIAL

It is on one hand difficult to describe the contributions of Professor Leon O. Chua in nonlinear circuits, dynamics and complexity, which he has accumulated during the last forty years of intensive research, and yet on the other hand it is easy to do so simply because his contributions are all-rounded in the field. Indeed, Professor Chua's fundamental contributions have ranged from the core theory of nonlinear circuits and systems to many inventions and analyses especially on the celebrated Cellular Neural Networks (CNNs). It is also hard to miss the simple but rich chaotic circuit under his name. Anyone who can produce *one* of these masterpieces in nonlinear dynamics research should be acknowledged for his success, but Professor Chua has made them all with transparent clarity, mathematical rigor, and practical applicability. The significant impact of his works on the society and in the field is reflected in the numbers of citations given by the ISI (Institute for Scientific Information) database *Science Citation Index Expanded*, available on the *Web of Science*[1] . The data there were obtained by selecting the mostly cited books and papers during the period of 1970 – March of 2001, when the number of citations is near 100 or beyond. According to the ISI citation classics, less than one percent of articles were cited for more than 50 times, so the number 100 reflects a high impact according to this standard. Professor Chua's books [1] and [2], listed below, clearly signify his profound contributions in the direction of general circuits and systems theory. Papers [3], [4] and [8] are the most cited papers dealing with Chua's circuit and nonlinear dynamics. Papers [5], [6], [7], [9] and [10] are his most important contributions to the CNNs to date when measured according to the citation impact. In addition, paper [11] presents a kind of hybrid discovery between complexity and nonlinear dynamics. These numerics provide just another measure of his outstanding academic quality.

Through this special issue, I would like to commend the vision and contributions of this great scientist, to honour his 65th birthday.

Finally, I would like to acknowledge the dedication and work of Professors Mario di Bernardo and Guanrong Chen, special editors of this theme issue, the invited authors, and the anonymous reviewers, for their participation and assistance on this special occasion of joyful celebration.

Jorge Luis Moiola
Editor-in-Chief

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[1] The support of the ISI Help Desk in Europe in collecting part of this data is greatly appreciated.

LIST OF THE MOSTLY CITED PUBLICATIONS OF
PROFESSOR LEON O. CHUA
DURING 1970-2001

Books:

[1] Chua L. O. and P. M. Lin, *Computer Aided Analysis of Electronic Circuits: Algorithms and Computational Techniques*, Prentice-Hall, Englewood Cliff, New Jersey, (1975). **Number of citations: 534.**

[2] Chua L. O., C. A. Desoer and E. A. Kuh, *Linear and Nonlinear Circuits*, McGraw-Hill, New York, (1987). **Number of citations: 182.**

Articles:

[3] Chua L. O., M. Komuro and T. Matsumoto, "The double scroll family I. Rigorous proof of chaos," *IEEE Transactions on Circuits and Systems* **33**, N. 11, 1072-1097, (1986). **Number of citations: 98.**

[4] Parker T. S. and L. O. Chua, "Chaos – A tutorial for engineers," *Proceedings of the IEEE* **75**, N. 8, 982-1008, (1987). **Number of citations: 90.**

[5] Kennedy M. P. and L. O. Chua, "Neural networks for nonlinear programming," *IEEE Transactions on Circuits and Systems* **35**, N. 5, 554-562, (1988). **Number of citations: 159.**

[6] Chua L. O. and L. Yang, "Cellular neural network: Theory," *IEEE Transactions on Circuits and Systems* **35**, N. 10, 1257-1272, (1988). **Number of citations: 465.**

[7] Chua L. O. and L. Yang, "Cellular neural network: Applications," *IEEE Transactions on Circuits and Systems* **35**, N. 10, 1273-1290, (1988). **Number of citations: 209.**

[8] Chua L. O., "The genesis of Chua circuit," *Archiv für Elektronik und Übertragungstechnik* **46**, N. 4, 250-257, (1992). **Number of citations: 92.**

[9] Chua L. O. and T. Roska, "The CNN paradigm," *IEEE Transactions on Circuits and Systems - Part I* **40**, N. 3, 147-156, (1993). **Number of citations: 122.**

[10] Roska T. and L. O. Chua, "The CNN universal machine: An analogic array computer," *IEEE Transactions on Circuits and Systems- Part II* **40**, N. 3, 163-173, (1993). **Number of citations: 125.**

[11] Wu C. W. and L. O. Chua, "A unified framework for synchronization and control of dynamical systems," *International Journal of Bifurcation and Chaos* **4**, N. 4, 979-998, (1994). **Number of citations: 107**.

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C O N T E N T S

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