Chaos Control and Anti-control: Theory and Applications

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Abstract

The traditional trend of understanding and analyzing chaos has evolved to ordering and utilizing chaos today. A new research direction in the field of applied chaos technology not only includes controlling chaos, which means to weaken or completely suppress chaos when it is harmful, but also includes anti-control of chaos, which refers to enhancing existing chaos or purposely creating chaos when it is useful and beneficial.

Chaos control and anti-control research promises to have a major impact on many novel, time- and energy-critical applications, such as high-performance circuits and devices (e.g., delta-sigma modulators and power converters), liquid mixing, chemical reactions, biological systems (e.g., in the human brain, heart, and perceptual processes), crisis management (e.g., in jet-engines and power networks), secure information processing (e.g., chaos-based encryption and secure communications), and decision-making in critical events. This new and challenging research area has become a scientific interdisciplinary, involving engineers from control systems, electronics, mechanics, and life sciences, as well as applied mathematicians, physicists, physiologists, biologists and, above all, nonlinear dynamics specialists.

This talk will provide an overview of some exciting and promising applications and the foreseeable future of the emerging chaos control technology.

About the Speaker

Professor Chen received his MS degree in computer science and PhD degree in applied mathematics, with Post-Doc research experience in nonlinear systems dynamics and controls. He is an IEEE Fellow (since 1996) and currently Chair Professor and the Director of the Centre for Chaos Control and Synchronization at the City University of Hong Kong. He serves as Advisory and Associate Editors for 7 international journals, and published 14 books, over 200 journal papers and 170 conference papers, with 3 best journal paper awards. He is Honorary Professor of the Central Queensland University, Australia, and Honorary Guest-Chair Professor of several universities in China. The topic of this seminar is within the scope of his long-term academic pursuit and research focus.