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**Some New Phenomena in Several Practical Systems and Relevant Challenges**

In this talk we first discuss multiple period-doubling bifurcations leading to chaotic gaits in some passive walking models and relevant challenges. Then we discuss non-uniform hyperbolicity of chaotic sets occurring in some four-dimensional practical ODEs and its challenge to the current theory of differentiable dynamical systems. Lastly, we present marvelous dynamics observed in very simple polynomial systems—the Nosé–Hoover oscillators.

**Xiaosong Yang** is a Professor of Mathematics and Control Theory at Huazhong University of Science and Technology. He obtained his Ph.D. in 1998 from the University of Science and Technology of China. His permanent research interests are:

1. Differentiable dynamical systems and piecewise-smooth dynamical systems and their applications.
2. Differential topology.
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