



SEMINAR

Synchronization in Nonlinear Micro-Oscillators: Mechanisms and Cross-Scale Applications

Date: 26 March, 2026 (Thursday)
Time: 4:00 p.m.
Venue: Room 7-34 & 7-35
Haking Wong Building, HKU



Speaker: Dr. Zhan Shi
Postdoctoral Researcher
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Abstract:

Synchronization in nonlinear micro-oscillators provides a powerful platform for uncovering complex coupling dynamics and achieving high-precision control. This lecture focuses on the fundamental mechanisms and regulation strategies of synchronization, with particular emphasis on how nonlinear effects contribute to reduced synchronization time, bandwidth expansion, and enhanced frequency stability. The results offer theoretical insights and design guidance for high-performance sensing, signal processing, and microscale system control. Furthermore, the talk explores cross-scale applications of synchronized motion in acoustic robotics and medical devices, highlighting its potential for collective coordination and precision manipulation.

Reference:

Shi, Zhan, et al. "Ultrasound-driven programmable artificial muscles." *Nature*.
Shi, Zhan, et al. "Noise-enhanced stability in synchronized systems." *Science Advances*.

Biography:

Dr. Zhan Shi is currently a postdoctoral researcher at Westlake University. He received his Ph.D. in nonlinear stochastic dynamics and control from Zhejiang University in 2024. He is currently conducting postdoctoral research with Professor Marco Amabili, working at the intersection of nonlinear dynamics and microsystems engineering. His research focuses on nonlinear dynamics and control in micro- and nano-electromechanical systems (MEMS/NEMS) and ultrasound-driven systems, connecting nonlinear theory with practical microsystem applications in sensing, signal processing, and acoustic robotics. Dr. Shi has published more than 30 papers, including first-author articles in *Nature*, *Science Advances*, and leading journals in dynamics and microsystems. He has been invited to present his work at major international and national conferences, including IEEE NEMS 2026, the 2025 Chinese Congress of Mechanics, the 7th ASME Cross-Strait Conference on Vibration and Control, and the 14th National Conference on Stochastic Dynamics (2025). He is the recipient of the 2024 *Microsystems & Nanoengineering* Rising Star Award and the First Prize of the Shaanxi Mechanical Engineering Society (2022).

ALL INTERESTED ARE WELCOME

For further information, please contact Professor X.F. Li at 3917 7904.