# 邀请报告-4 (Plenary Lecture-4)

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| 7月20日15:20-16:20 | July 20, 15:20-16:20 |
| 辽宁大厦沈阳厅 | Shenyang Meeting Room |
| **YangQuan Chen (University of California, Merced)**  **Bode’s ideals are fractional order – from Bode’s ideal gain crossover (BIGC) behavior to Bode’s ideal cut-off (BICO) behavior**  主席(Chair): Yi Huang (Academy of Mathematics and Systems Science, Chinese Academy of Sciences) | |

**Abstract:** The lecture goes back to H. W. Bode’s 1945 classic book and focuses on two aspects: Bode’s discussions on gain crossover (BIGC) behavior and cut-off (BICO) behavior. I will reveal the fact that, Bode’s ideal loop transfer function as well as Bode’s ideal cut-off are both fractional order (FO) irrational transfer functions. Impulse response invariant discretization method is introduced to make those FO transfer functions realized in IIR forms with illustrative examples. Applications of the BIGC and BICO are introduced and their potential application in ADRC is outlined.

**YangQuan Chen** earned his Ph.D. from Nanyang Technological University, Singapore, in 1998. He had been a faculty of Electrical Engineering at Utah State University from 2000-12. He joined the School of Engineering, University of California, Merced in summer 2012 teaching “Mechatronics”, “Engineering Service Learning” and “Unmanned Aerial Systems” for undergraduates; “Fractional Order Mechanics” and “Nonlinear Controls” for graduates. His research interests include mechatronics for sustainability, cognitive process control, small multi-UAV based cooperative multi-spectral “personal remote sensing”, applied fractional calculus in controls, modeling and complex signal processing; distributed measurement and control of distributed parameter systems with mobile actuator and sensor networks.

Dr. Chen serves as a Co-Chair for IEEE Robotics and Automation Society Technical Committee (TC) on Unmanned Aerial Vehicle and Aerial Robotics (12-18). He recently served the TC Chair for the ASME DED Mechatronics Embedded Systems Applications (2009-10); Associated Editor (AE) for IEEE Trans. on Control Systems Technology (00-16), ISA Trans. (12-17), IFAC Control Engineering Practice (12-17) and Journal of Dynamics Systems, Measurements and Control (09-15). He now serves as Topic Editor-in-Chief of International Journal of Advanced Robotic Systems (Field Robotics), Section AE (Remote Sensors) for Sensors, Senior Editor for International Journal of Intelligent Robotic Systems, Topical AE for Nonlinear Dynamics (18-) and AE for IFAC Mechatronics, Intelligent Service Robotics; IET Control Theory and Applications, and Fractional Calculus and Applied Analysis. He is a member of IEEE, ASME, AIAA, ASPRS, AUVSI and AMA.

Dr. Chen started some new investigations, published some papers and books, graduated some students, hosted some visiting scholars and also received some awards including the IFAC World Congress Best Journal Paper Award (Control Engineering Practice, 2011), First Place Awards for 2009 and 2011 AUVSI SUAS competitions, and most importantly, the “Relationship Counselor” award from IEEE Utah State University Student Branch for “explaining human relationship using control theory.”

# 专题研讨会-4 (Panel Discussion 4)

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| 7月20日16:20-17:50 | July 20, 16:20-17:50 |
| 辽宁大厦沈阳厅 | Shenyang Meeting Room |
| **Fractional Order and ADRC**  **分数阶与自抗扰控制**  主席(Chair): Yangquan Chen (University of California, Merced) | |

**Panelists:**

Yangquan Chen, University of California, Merced

Xiaohong Wang, South China University of Technology

Mingda Li, Beijing Information Science & Technology University

Ying Luo, Huazhong University of Science and Technology

Chunyang Wang, Changchun University of Science and Technology

**Abstract:** If the world, as the dynamics of change, is to be described with the language of fractional order calculus, our understanding of active disturbance rejection control could take a drastic turn. The questions could be posed as follows: 1) What is gained and sacrificed by using the integer ADRC to deal with fractional order dynamics? 2）How can Prof. Han’s Nonlinear ADRC be better understood using the vast literature on Fractional Order Calculus. This panel discussion bring together scholars whose research overlaps both areas, to pose research questions and to give an outlook for the interplay between the two fields in the near future.