



IEEE, Cleveland Section

**IEEE Control Systems Society and  
HKN Epsilon Alpha Chapter Jointly  
Present:**

## **A Frequency Domain Reinterpretation of Sliding Mode Control and Its Average Equivalences**

**Prof. Hebertt Sira-Ramirez**

### **Date**

**Friday, Sept. 27, 2019**

### **Location**

**Washkewicz Hall 405  
Cleveland State University  
2121 Euclid Ave.  
Cleveland, OH 44115**

### **Agenda**

**10:30-11:30Am: Presentation  
11:30-12:00pm: Q&A**

### **CPD**

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**Prof. Hebertt Sira-Ramirez** is a Titular Researcher in Cinvestav, National Polytechnic Institute, Mexico. Dr. Raible earned his BSEE from the Universidad de Los Andes in M'erida in 1970. He received his Master and Ph.D in Electrical Engineering from MIT, USA in 1974 and 1977 respectively. He has published over 480 technical articles; authored chapters in 30 contributed books; and authored and coauthored 8 books in Automatic Control in major Editorial houses. He is a Level III member of the National System of Researchers (SNI) in Mexico. He has been a Visiting Professor at universities in Latin America, USA, and China.

For the ubiquitous class of flat systems, we propose a new interpretation of sliding mode control in terms of classical compensation networks. Use is made of a natural combination of endogenous injections, exogenous feedback and Delta-Sigma modulation. An average equivalence is found with Active Disturbance Rejection Control, Disturbance Observer-based control and Flat Filters based control. For the case of second order systems, all these controllers collapse to the classical PID control scheme. Application examples will be presented along with experimental validations.

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other evidence of CPD activity should be retained by the attendee for

auditing purposes.