



MESA (Mechatronics, Embedded Systems and Automation) Lab
Presents
A Research Seminar at The
Applied Fractional Calculus (AFC) Workshop Series

Date/Time/Place: 05/19/2014, 4-6PM, MESA Lab (Room 820), 4225 N. Hospital Rd., Atwater, CA 95301. T: 209-2284398

Title: Optimization Strategies for Building Energy Management Systems

Abstract: We analyze the control complexity for Heating, Ventilation, and Air-Conditioning equipment units by a building automation demo system, introduce physical dynamic models about Air Handling Unit, degrees of freedom and constraints on the basis of model predictive control technology

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Speaker's short biography:



Xiaobao Jia received his bachelor degree from Beijing University of Chemical Technology in 1999, master degree from Xidian University China in 2006, and his major is automatical control. His research interests focus on both the control theory and building energy-saving technology.

Key references:

- [1] Victor M. Zavala. Real-Time Optimization Strategies for Building System. 2012
- [2] Eduardo F. Camacho, Carlos Bordons. Model Predictive Control(second edition)



Integer-Order Calculus



Fractional-Order Calculus

Fractional Order Mechanics!

Hooke's law: $F = kx$
Newton's fluid: $F = kx'$
Newton's 2nd law: $F = kx''$
 $\rightarrow F(t) = kx^{(\alpha)}(t)$

Going in-between: interpolation of operators:

$$\dots, \frac{d^{-2}f}{dt^{-2}}, \frac{d^{-1}f}{dt^{-1}}, f, \frac{df}{dt}, \frac{d^2f}{dt^2}, \dots$$