

**Mechatronics, Embedded Systems and Automation (MESA) Lab
Presents**

Fractional Calculus Day @ UCMerced

<http://mechatronics.ucmerced.edu/research/applied-fractional-calculus>

(Please email RSVP to Prof. YangQuan Chen if you plan to attend by June 10th, Monday)

Organizer:

Prof. YangQuan Chen, ME/EECS/SNRI/UCSolar, School of Engineering, E: ychen53@ucmerced.edu

When and Where:

June 12, 2013. Wednesday, 9AM-5PM.

MESA LAB @ 4225 N. Hospital Rd., Atwater, CA 95301. Tel: (209)-2284398

Why you should attend?

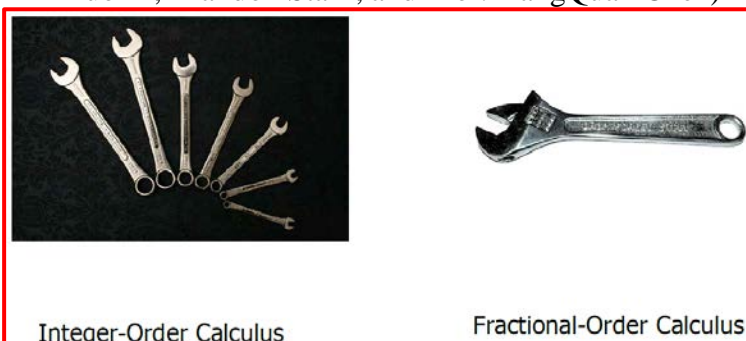
Fractional calculus (FC) is about differentiation or integration of non-integer orders. The concept of fractional calculus has tremendous potential to change the way we see, model, and control the nature around us. Using integer order calculus, behaviors of many complex systems are being said to be “anomalous” such as “anomalous relaxation”, “anomalous diffusion” etc. It has already been known that “anomalous is normal” from observation and modeling point of view if fractional calculus is used. Meanwhile, beneficial uses of the mathematical tool of fractional calculus from engineering point of view are being shown and (hopefully) fractional calculus will become an enabler for new science discoveries.

If you wish to do potentially transformative research using this new tool of FC, **FC Day @ UCMerced** event is for you!

If you wish to meet ALL top 3 researchers in the field of FC (per http://scholar.google.com/citations?view_op=search_authors&hl=en&mauthors=label:fractional_calculus) in one room in a full day interaction, **FC Day @ UCMerced** event is for you!

Confirmed Speakers:

- Prof. George Chiu, Program Director, Control Systems/CMMI/ENG, NSF.
- Professor Francesco MAINARDI, Department of Physics, University of Bologna, Via Irienerio 46, I-40126 Bologna, Italy.
- Professor Igor Podlubny, BERG Faculty, Technical University of Kosice, Slovakia.
- Professor Eric Brown, Dept. of Physics, School of Natural Sciences, UC Merced, California, USA.
- Dr. Nickolay Korabel, Dept. of Physics, School of Natural Sciences, UC Merced, California, USA.
- Professor Christopher T. Kello, Cognitive Mechanics Lab, School of Social Sciences, Humanities and Arts, UC Merced, California, USA.
- Other MESA LAB AFC (Applied Fractional Calculus) Group members (Prof. Jiaguo Liu, Chun Yin, Zhuo Li, Brandon Stark, and Prof. YangQuan Chen)



Fractional Order Mechanics!

Hooke's law: $F = kx$

Newton's fluid: $F = kx'$

Newton's 2nd law: $F = kx''$

→ $F(t) = kx^{(\alpha)}(t)$

Going in-between: interpolation of operators:

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