# *Special Joint Seminar*

## MMEC SEMINAR SERIES

MECHANICS: MODELING,
EXPERIMENTATION, COMPUTATION

and

## PHYSICAL MATHEMATICS SEMINAR

# THEORY AND PRACTICE OF ACTIVE MICROFLUIDIC DEVICES


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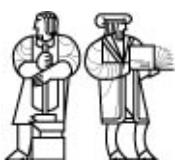
**ABSTRACT:**

Parallels between microelectronics and microfluidics are numerous. The premise of both fields is that basic components are assembled into input-output superstructures that perform specific tasks – computation in the case of microlectronic chips, chemical processing (typically) in the case of microfluidic chips. Efficiency and robustness of components affects the performance of the resulting device. Active components are a fortiori more efficient and less robust than passive components. Theoretical background or lack thereof can also affect the outcome of the device design.

In this talk I will discuss aspects of theory and experiments in two active microfluidic devices, a "mixer" and a universal device ("microfluidic CPU") that can perform mixing, separation, ransport and concentration in a single chamber. The theoretical methods used to understand function in both of those are from dynamical systems theory. I will conclude by discussing the theoretical framework of large-scale systems, where robustness of performance of the system is studied in the context of uncertainty of performance of individual components.


**TUESDAY, APRIL 24, 2007**
**4:00 PM**
**Building 3, Room 370**

***Light refreshments will be available a few minutes before the seminar, in the hallway just outside Room 3-370.***

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