

PHYSICAL MATHEMATICS SEMINAR

ELECTROKINETIC PHENOMENA AND ITS RELATIONSHIP TO MICROFLUIDICS FROM THE VIEWPOINT OF OLD THEORIES

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ABSTRACT:

Electrokinetic phenomena are known for two centuries. The most known effect is electrophoresis. There is a variety of other effects that arises in heterogeneous liquid based systems due to peculiar features of interfacial layers. These layers are usually electrically charged. There were numerous theories developed in 20th century for describing these phenomena. Some ideas from those theories might be useful for mathematical modeling of modern microfluidic devices. These ideas include:

- Thermodynamics of non-equilibrium processes;
- Smoluchowski principle of similarity between hydrodynamics and electrostatics;
- Thin double layer approximation;
- Ionoforetic approach for describing concentration polarization of interfaces;
- Difference between equilibrium, quasi-equilibrium and driving electric potentials;
- Unbalanced AC fields.

We discuss how these ideas simplify mathematical modeling of electrokinetic phenomena.

These ideas had been experimentally verified very extensively. We present some old photographs and experimental data that are relevant to this subject.

TUESDAY, MAY 15, 2007
2:30 PM
Building 2, Room 146

*Refreshments at 3:30 PM in Building 2, Room 349
(Applied Math Common Room)*



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