Curriculum Vitae

Mohammad A. Charsooghi

Personal Information

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Education

I have been a physics student of "Continuous Track PhD Program (CTPhD)" since September 1999, in Institute for Advanced Studies in Basic Sciences, Zanjan, Iran. Now I am in the seventh year of this program, had finished my courses, and have been started my PhD thesis since winter 2005.

A little about CTPhD
This program has started since September 1999, in Institute for Advanced Studies in Basic Sciences (IASBS), for the first time in Iran. The students, which want to attend in this program, should be in the first thousand of students in the entrance exam of universities, which taking each year by ministry of science in Iran (total number of attendees are about 500,000).

This program consist of two major parts, in the first 4-5 years one should pass the courses, which cover BSc, MSc and PhD course. In the next 3 years one work on it's PhD thesis.

Honors and Awards

- Outstanding student in entrance exam of universities in Iran, (1999).
- Outstanding student in internal computer Olympiad of Iran, (1998).
- Outstanding student in internal physics Olympiad of Iran, (1998).

Research Areas

Experimental Colloidal Science
- Thermal Diffusion Phenomena.

Experimental Soft and Biophysical Matter
- Optical Tweezers.
- Movement of an E-Coli.

Summery of Researches

Between winter 2004 and 2005, with two of my friends and under the advice of Dr. Golestanian and Dr. Khalesifard, we studied the physical properties of porous and fractured glass using optical methods. We measured the porosity of these media using optical spectroscopy. We designed and fabricated a low-cost oven with an optical imaging apparatus to monitor the dynamics of the cracks visually. We discussed about the data and results with Prof. Swinney and Prof. Marder (Physics Dept. University of Texas, Austin) and Prof. Sahimi (Chair, Chemical Engineering Dept. USC). Refer to my proceedings.

In winter 2005 I joined to Optical tweezers group in (IASBS) for my PhD thesis. I choose Optical tweezers and their applications in biology, specially DNA properties, for my PhD research, and Dr. Golestanian is my supervisor. First we measured lateral efficiency of the trap, and investigated the effect of some optical parameters (to be appear in Optics Communication, Available online). Then we worked on efficient trapping in arbitrary depth by an oil immersion objective lens. By introducing new optical state we could have efficient trap in the arbitrary depth. It would be very useful for experiments, which the effects of surface aren't negligible. Before that people could only have efficient trap near the surface. It has been accepted by Optics Letter (refer to my publication).

Now I am working on Thermal Diffusion Phenomena, trying to measure such a forces using Optical Tweezers. Here we try to find out the basic reasons which cause binary mixtures move under thermal gradient. It's a very complex phenomena because all gravitational forces, electrostatic forces, osmotic pressure and inertia moment are important.

Technical Skills

- Working with parallel/serial ports to control hardware devices such as stepper motors, RTDs (Resistance Temperature Detectors), ... with computer.
- Design, simulation and implementation of digital and analog circuits.
- Image Processing using MATLAB.
- Numerical modeling and simulation of physical systems with MATLAB and Mathematica and LabVeiw.
- Remote controlling with ordinary TV controllers.
- Working with Upright and Inverted Microscopes (Bright Field/DIC/flourecence Microscopy).
- Working with Microforge (*MF-900, Narishige*) and Pipette Puller (*PC-10, Narishige*)
- Working with data acquisition and image grabber cards.
- Working with 8051 Micro Controllers.

Work Experiences

- Setting up an Optical Tweezers device.
- Motorizing Inverted Microscope using stepper motor, and also design and implementation of its driver to control it with computer.
- Design and implementation of circuit to control RTD (Resistance Temperature Detectors) to measure surface temperature with computer (for the latter I used NI data acquisition card).
- Design and implementation of elementary lab oven, with ability of taking film in high temperature.
- Making Z80 microprocessor in electronics lab (The Z80 microprocessor is an 8-bit CPU with a 16-bit address bus capable of direct access of 64k of memory space. It has a language of 252 root instructions).

Other Activities

- Assistant in Optical Tweezers Lab: September 2004 - now.
- Assistant in electronics lab of IASBS: September 2003 - now.
- Executive organizer in 11th annual IASBS meeting on condensed matter physics 5-6 khordad 1384 (May 26-27, 2005), Zanjan, Iran.
- Working in "Audio and Vision" section of IASBS: September 2001 - September 2003.
- Poster designing for seminars, workshops and entrance exams of IASBS.
- Homepage designing for web pages of IASBS.

Publications

Paper

- S.N.S. Reihani, M.A. Charsooghi, H.R. Khalesifard, and R. Golestanian, *"Efficient in-depth trapping with an oil immersion objective lens"*, **Opt. Lett.** Vol. **31**, Iss. 6 (pp. 766-768) March 15, 2006.

Proceeding

- R. Farhadifar, M. A. Charsooghi, A. Faridian, H. R. Khalesifard, R. Golestanian, *"Physical properties of fractured soda-lime glasses"*, **Statistical Physics of Com plex Fluids STATPHYS22 Satellite Meeting** (June 27 July 1, 2004), Zanjan-Iran.

- A. Faridian, M. A. Charsooghi, R. Farhadifar, H. R. Khalesifard, R. Golestanian, *"Measuring porosity of porous media created in soda-lime glasses by ion exchange technique using optical spectroscopy"*, **10th Annual Conference of Optics and Photonics** (January 28-30, 2004), Kerman-Iran.

Talk

International

- *"Increasing efficiency in Optical Tweezers by introducing new source of aberration"*, **Max Planck Institute for the Physics of Complex Systems (MPI-PKS)**, (May 3, 2006), Dresden, Germany.

National

- *"The biological Applications of Optical Tweezers"*, **Annual IASBS special schools for undergraduates, IASBS** (Institute for Advanced Studies in Basic Sciences), (May 23, 2007), Zanjan, Iran.
- *"Optical Tweezers and Their Applications"*, **Annual meeting of Physics, Payam Nour University**, (May 2006), Zanjan, Iran.

Attended Schools & Workshops

International

- Workshop on driven states in soft and biological matter, *(April 18-28, 2006)*, ICTP, Trieste, Italy.
- Statistical Physics of Complex Fluids STATPHYS22 Satellite Meeting, *(June 27-July 1, 2004)*, Zanjan, Iran
- International Summer School on Soft and Biological Matter, *(June 5-25, 2004)*, Zanjan, Iran.

National

- 14th Spring Theoretical Physics Conference, *(May 3-5, 2007)*, IPM, Tehran, Iran.
-10-13th annual IASBS meeting on condensed matter physics, 5-6 khordad 1383-85 (May 26-27, 2003-06), Zanjan, Iran.
- (7-11)th Winter School (Condensed Matter Physics, ,Optics and Laser Physics,Statistical

Physics,High Energy Physics), (January , 2000-04), Zanjan, Iran.
- Annual Physics Conference of Iran (August 27-30, 2001), Sabzevar, Iran.

Teaching Experiences

Teaching
- Fluid Mechanics, *Summer 2007*, Zanjan University.
- BioPhysics, *Winter-Spring 2006-07*, Zanjan University.
- Waves and Oscillations, *Fall-Winter 2006-07*, Zanjan University.
- Mathematical Physics I, *Winter-Spring 2006*, Zanjan University.

Teaching Assistant
- Advanced Classical Mechanics, *Fall-Winter 2005-06*, IASBS, Zanjan.
- Electronics, *Winter-Spring 2005*, IASBS, Zanjan.

Computer Skills

Programming Languages: Fortran, and familiar with C, C++ and a little assembly.
Operating Systems: Windows, Linux, Dos.
Mathematical Softwares: MATLAB, Mathematica, TecPlot.
Graphical Softwares: Photoshop, Corel Draw, Xfig.
Experimental Softwares: LabView, Pinnacle PCTV, Videosun, Adobe Premier.

Language Skills

- Persian (my native language)
- English (Fluent)
- French (Beginner)
- Italiano (Beginner)
- Arabic (Low Intermediate)

References

References will be furnished if required.