

# ABBAS NASIRAEI MOGHADDAM

California Institute of Technology  
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## AREAS OF INTEREST

- ❖ Medical Imaging, Image processing and Visualization
- ❖ Microscopy, Cardiovascular MRI, Phase-Contrast, DENSE
- ❖ Heart Biomechanics and Biofluid dynamics

## EDUCATION

### **CALIFORNIA INSTITUTE OF TECHNOLOGY**

#### **PhD, Bioengineering**

Expected: 2006

*Thesis:* Measurement and Analysis of Structure and Function of Myocardium in Embryonic and Adult Heart

*Advisor:* Prof. Morteza (Mory) Gharib

### **UNIVERSITY OF TEHRAN, IRAN**

#### **M.S., Electrical Engineering: Biomedical**

1998

*Thesis:* Analysis of Electromagnetic Fields Distribution in MRI systems in Human Head Presence

*Advisor:* Prof. Hamid Soltanian Zadeh

### **UNIVERSITY OF TEHRAN, IRAN**

#### **B.S., Electrical Engineering: Electronics**

1995

## RESEARCH EXPERIENCE

#### **Research Assistant**

2003-present

**California Institute of Technology, Pasadena, CA**

- Proposing a new model to relate the embryonic heart structure and function based on Confocal Microscopy images of zebrafish
- Studying cardiovascular biomechanics and muscle band theory through Medical Imaging and Image processing
- Performing cardiac MRI and optimizing DENSE MRI parameters on 3T scanner
- Studying the mechanism of collapse of the vessels by Phase Contrast MRI on the phantom

#### **Technician Researcher**

2001-2003

**Barnes-Jewish hospital/Washington university, Saint Louis, MO**

CVIA Lab/Cardiology Division

- Performed research on Cardiovascular MRI (Phase Contrast): imaging and factor analysis
- Developed computational algorithms to calculate hydrodynamic pressure from PC MRI in pathological vessels and compared the results with CFD

## PROFESSIONAL EXPERIENCE

#### **Assistant Director, Bioelectric Signal and Image Processing Laboratory**

1999-2001

**University of Tehran, Tehran, Iran**

- Developed and directed experiments for Master students
- Worked on the standards of medical instrumentation
- Set up, equipped and organized the lab

# ABBAS NASIRAEI MOGHADDAM

**Biomedical Engineer** 1998  
Kaavandish company, Tehran, Iran

- Design & development of bio instruments related to electrosurgical generator

**Electronics Engineer** 1994-1995  
Institute of Electrotechnique, Tehran, Iran

- Design of a digital controller based on 8051 microcontroller technology to control Fitotron plant growth rooms.

## TEACHING EXPERIENCE

### Teaching Assistant

#### ▪ California Institute of Technology

- *Course:* Biofluid Mechanics (BE/AE 243) 2005
- *Course:* Physiology (BE201 a) 2004

### Lecturer

#### ▪ University of Tehran

- *Course:* An Introduction to Biomedical Engineering
  - ❖ Designed the curriculum and **initiated** this course in Tehran University
  - ❖ Taught the course for senior undergraduate students for two successive years 1999-2001
- *Course:* Special Topics in Biomedical Engineering (Lecturer assistant) 1999
  - ❖ Taught the principles of MRI for graduate students in 5 lectures
  - ❖ Designed and guided the experiments in simulation and image processing

#### ▪ Islamic Azad university of Tehran

- *Course:* Logic Circuits 1999

### General Education Teacher

- Taught a variety of subjects including math and computer classes at Nikan High school 1994-2001

## JOURNAL PUBLICATIONS

**Nasiraei-Moghaddam A.**, Behrens G., Fatourae N., Agarwal R., Choi E., and Amini A. "Factors Affecting Accuracy in Measurement of Intravascular Pressure from Phase-Contrast MRI," *Magnetic Resonance in Medicine*, 52:300–309 (2004)

Forouhar A.S., Hickerson A., Liebling M., **Nasiraei-Moghaddam A.**, Lu J., Tsai H., Hove J.R., Fraser S.E., Dickinson M., Gharib M. "The Embryonic Vertebrate Heart Tube Is a Dynamic Suction Pump," *Science*, 312: 751-753 (2006).

**Nasiraei-Moghaddam A.**, Liebling M., Forouhar A.S., Tsai H-J., Fraser S.E., and Gharib M. "A Lagrangian Approach Reveals the Active and Passive Regions in the Embryonic Zebrafish Heart," Submitted to the *journal of Biomechanics and Modeling in Mechanobiology*.

Saber N.R, **Nasiraei-Moghaddam A.**, Wen H., Ross B.D., Gharib M., "Construction of the Myocardial Lagrangian Strain Field using DENSE MRI," Submitted to the *journal of Biomechanics and Modeling in Mechanobiology* second revision.

**Nasiraei-Moghaddam A.**, Amini A., Wen H., Gharib M., "Myocardial Dynamics from DENSE MRI via NURBS model." In preparation.

**Nasiraei-Moghaddam A.**, Fraser S.E., Morteza Gharib "On the Structure – function relationship in embryonic zebrafish heart: Dynamic Analysis." In preparation.

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## CONFERENCE PUBLICATIONS

**Moghaddam A.N.**, H. Wen, M. Gharib “More Comprehensive Cardiac DENSE MR Imaging by Combination of Short Axis and Long Axis Data,” *ISMRM 14th Scientific Meeting*. 2006, Seattle, USA.

**Moghaddam A.N.**, Arian S. Forouhar, Michael Liebling, Tsai H., Morteza Gharib “Structure and function relationship of zebrafish embryonic heart from confocal microscopy images,” *SPIE’s Medical Imaging 2006*, San Diego, California, USA. (Proceedings of SPIE Vol. 6143, pp.614301-1-8.)

Wang Y., **Moghaddam A.N.**, Fatouree N., Behrens G., Cebra J., Choi E.T., Amini A.A. “Pulsatile Pressure Measurements Via Harmonics-Based Orthogonal Projection of Noisy Pressure Gradients,” *SPIE’s Medical Imaging 2006*, San Diego, California, USA. (Proceedings of SPIE Vol. 6143, pp.61430C-1-16.)

**Moghaddam A.N.**, Fatouree N., Choi E.T., Amini A.A., “A Fast method for Computation of the Static Pressure field in Stenotic geometries by PC MRI,” *SPIE’s Medical Imaging 2003*, San Diego, California, USA. (Proceedings of SPIE Vol. 5031, pp.31-42.)

**Moghaddam A.N.**, Soltanian Zadeh H., “Mapping of magnetic field inhomogeneity and removal of its artifact from MR images,” *SPIE’s Medical Imaging 2003*, San Diego, California, USA. (Proceedings of SPIE Vol. 5032, pp.780-787.)

G Behrens, R Agarwal, A.N **Moghaddam**, ET Choi, A. Amini “Numerical Simulation of Steady and Pulsatile Flow Through Vascular Stenoses and Comparisons with Experiments Using Phase Contrast Magnetic Resonance Imaging,” *American Physical Society, Division of Fluid Dynamics 56th Annual Meeting*, November 23-25, 2003, East Rutherford, New Jersey, USA.

G. Behrens, R. Agarwal, A. **Moghaddam** and A. Amini “Computational Study of Aortic Stenosis and Aneurysm and Comparisons with Experiments Using Phase Contrast Magnetic Resonance Imaging,” 3rd AIAA Fluid Dynamics Conference and Exhibit, Orlando, Florida, June 23-26, 2003

**Moghaddam A.N.**, Soltanian Zadeh H., “Simulation and Correction of MRI Distortions Caused by Nonuniformity of Static Magnetic Field,” 9th Iranian Conference of Biomedical Engineering, 2000, Tehran, Iran.

**Moghaddam A.N.**, Soltanian Zadeh H., Faraji-Dana R. “Calculation of Static Magnetic Field Distortions in MRI System By F.D. Method,” 7th Iranian Conference of Electrical Engineering(*ICEE*), 1999, Tehran, Iran.

## SEMINARS AND TECHNICAL TALKS

**Nasiraei-Moghaddam A.**, Saber N.R., Wen H., Gharib M. “Analytical Methods for 3D Measurement of Cardiac Deformation from DENSE-MRI data”, *BMES conf.* 2005, Maryland, USA.

**Moghaddam A.N.**, Soltanian Zadeh H., “Correction of MRI Distortions Caused by Non uniformity of Static Magnetic Field,” *Medical Imaging Seminar*, 1999, Mathematics and Physics Research Center, Tehran, Iran.

**Moghaddam A.N.**, Soltanian Zadeh H., “Correction of Non homogeneity Effects of RF Magnetic Field in MR. Images of Human Head,” *Brain Imaging Seminar*, 1997, Mathematics and Physics Research Center, Tehran, Iran.

## HONORS & AWARDS

Bechtel fellowship from Caltech	2003-2004
Bioengineering scholarship 1 <sup>st</sup> and 2 <sup>nd</sup> place	1997, 1999
Iranian Mathematics Olympiad 12 <sup>th</sup> rank	1991

# ABBAS NASIRAEI MOGHADDAM

## PROFESSIONAL AFFILIATIONS

IEEE: Institute of Electrical and Electronics Engineers, Medicine and Biology Society  
ISMRM: International society for Magnetic Resonance in Medicine  
SPIE: International Society for Optical Engineering

## TECHNICAL SKILLS

Operating MRI Siemens scanners for cardiac pulse sequences as a super user  
Hardware: Micro controllers 8051, IBM PC-compatible running microsoft windows  
Programming/Software: C, Matlab, View Logic, SPICE, Tecplot, DPIV, DENSEView

## REVIEWER OF PROFESSIONAL JOURNALS

IEEE Transactions on Medical Imaging  
Medical Physics

## REFERENCES

**Morteza Gharib**, Hans W. Liepmann Professor of Bioengineering and Aeronautics (PhD Advisor)  
California Institute of Technology  
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**Scott E Fraser**, Anna L. Rosen Professor of Biology; Director, Biological Imaging Center  
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**Amir A. Amini**, Associate Professor of Medicine and of Biomedical Engineering  
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**Han Wen**, Chief, Imaging Physics Section, National Heart Lung and Blood Institute  
Laboratory of Cardiac Energetics  
Building 10, Room B1D416  
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**Hamid Soltanian Zadeh**, Professor of Biomedical Engineering and Image Processing  
Henry Ford Health System  
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