



FANGJUN SHU, PH.D.

Postdoctoral Research Fellow
University of Pittsburgh

Home address:
5435 Claybourne ST, Apt. 101,
Pittsburgh, PA 15232
E-mail: fangjun@gmail.com
Phone: 832-561-6312

Work address:
Center for Advanced Research and
Development of Medical Devices
700 Technology Dr. Suit 4220
Pittsburgh, PA 15219

ABILITIES AND EXPERIENCE:

- Experience of advanced flow diagnostic techniques (**experimental fluid mechanics**) including **PIV** (particle image velocimetry), **LDA** (laser Doppler anemometry), **PDA** (phase Doppler anemometry) and **PLIF** (planer laser induced fluorescence)
- Knowledge of advanced **fluid mechanics, solid mechanics, heat transfer, thermodynamics, statistics** and engineering **mathematics**
- Extensive experience in **digital signal/image processing**
- Knowledge of **CFD** (computational fluid dynamics); experience of using **FLUENT**
- Knowledge of **computational solid mechanics** (finite element method); experience of using **ANSYS**
- Knowledge of advanced **optical metrology**, experience in **laser assisted diagnosis**
- Experience in **mechanical/medical device design, test and innovation**
- Experience in **CAD** software including SolidWorks, Auto CAD and Iron CAD
- Experience of software **programming** in **Visual C++, JAVA, FORTRAN** and **MATLAB**
- Ability to use engineering expertise to define and solve problems
- Experience of leading team project
- Solid oral and written communication skills (English and Chinese)

EDUCATION:

Institute	Major	GPA	Degree/Date
Purdue University, West Lafayette, IN	ME, fluid mechanics (experimental)	4.0	Ph.D / Dec. 2005
Kansas State University, Manhattan, KS	ME, design (composite, FEM)	4.0	N/A
University of Science and Technology of China	ME, solid mechanics, optical metrology	3.8	M.E. / Jul. 2000
University of Science and Technology of China	ME, fluid mechanics (computational)	3.56	B.S. / Jul. 1997

EXPERIENCE:

- 1/06 – present Postdoc Research Associate, Biomedical Engineering, **Carnegie Mellon University**, Pittsburgh, Pennsylvania
- Prototype and experimental setup design use **SolidWorks**
 - Investigation of flow characteristics in pulsatile rotary blood pump using advanced **flow visualization (LIF, PIV, Tracer Particle visualization)** techniques; optimization of blood pump design to minimize hemolysis and thrombogenesis based on flow visualization results
 - Evaluation of Taylor vortices in a Pediatric Ventricular Assistant Device (**PVAD**) using a **micro-scale PIV** system built by myself; data processing using programs written in Visual C++ and MATLAB
 - **Digital image and signal** processing for various purposes including red blood cell recognition, cell counting, particle image noise reduction, and flow pattern recognition.
 - Use of **statistical** and **analytical** methods to analyze the efficiency and reliability of VADs
 - Provided advice/assistance to graduate students in their projects
- 1/01 – 12/05 Research Assistant (PhD student), Mechanical Engineering, **Purdue University**, West Lafayette, Indiana
- Water loop and spray control system design (**Auto CAD**) and manufacture
 - Passive control of a water jet using nozzles of various geometries to modify the mixing and turbulence characteristics
 - Nozzles and spray atomizers design using **Auto CAD** and **Iron CAD**

- Measurement and evaluation of jet performance and spray efficiency using **flow measurement** techniques (PIV, PDA, LDV and PLIF)
- **Statistical/uncertainty analysis** using software developed in **Visual C++** and **MATLAB**
- **Digital image process** of **PIV** and **LIF images**
- Flow performance evaluation in a **control valve**
- Lead of a small research group for a short summer project (design and evaluating performance of an air assisted spray atomizer)

8/00 – 12/00

Research Assistant (PhD student), Mechanical Engineering, **Kansas State University**, Manhattan, Kansas

- Finite element **modeling** and analysis of composite material using **ANSYS**
- Development of new finite element method applicable to composite materials using **Visual C++**, results compared with ANSYS simulations
- Composite material performance measurement

9/97 – 6/00

Research Assistant (Master's student), Mechanics and Mechanical Engineering, **University of Science and Technology of China**, Hefei, China

- Experimental investigation of deformation, stress/strain and vibration of solid structures
- Design, assembly and testing of an **Orthogonal Two-Way Holographic Interferometer**
- Design, assembly and testing of a **Real Time Electronic Speckle Pattern Interferometer (ESPI)**
- **Digital image processing** to analyze images, e.g. use of spin filter and fractional Fourier transform method to reduce noise in fringe pattern; use of FFT based method to extract strain/stress information from ESPI images.
- Development of an accurate numerical method to perform **Fast Fractional Fourier Transform** used in fringe pattern process and achieved good performance
- Teaching assistant for several courses

10/94 - 9/97

Research Assistant (Undergraduate student), Mechanics and Mechanical Engineering, **University of Science and Technology of China**, Hefei, China

- Wellbore pressure analysis in circular and infinite dual-porous and composite reservoirs using numerical methods based upon the Laplace transform; the method is now widely used in Chinese oil fields
- In charge of the computational part of a petroleum well pressure test software **WTES 3.0**

HONORS:

- Work of our group was reported in Voice of America (VOA), October 3, 2006
- Reported in MEMO, the School of Mechanical Engineering magazine at Purdue University, 2005
- Frederick A. Environmental Award, Purdue University, August 2004
- Guang-Hua Educational Scholarship, USTC, 1998-1999
- Excellent Student Scholarship of USTC, 1995-1996 and 1994-1995
- Member of American Physical Society

PUBLICATIONS AND PRESENTATIONS:

1. S. Vandenberghe, F. Shu, B. Paden and J. Antaki, "Fluid Dynamic Evaluation of Pulsatile Rotary Blood Pump," *International Society for Rotary Blood Pumps (ISRBP)* 14th congress, Aug. 31-Sep. 2 2006, Leuven, Belgium
2. F. Shu, M. W. Plesniak and P. E. Sojka, "Evolution of vertical structures in indeterminate origin nozzle jets", *Journal of Flow Visualization and Image Process*, 2006 (in press)
3. F. Shu, M. W. Plesniak, P. E. Sojka, "Indeterminate Origin Nozzles to Control Jet Structure," *Journal of Turbulence*, vol. 6, No. 26 (2005), pp. 1-18
4. F. Shu, M. W. Plesniak, P. E. Sojka, "Visualization of Streamwise Vortex Pairs in an Indeterminate Origin (IO) Nozzle Jet," *Journal of Visualization*, Vol.8, No. 3 (2005), pp. 195
5. F. Shu, M. W. Plesniak, P. E. Sojka, "Indeterminate Origin Nozzles to Control Jets," transactions of 11th *International Symposium on Flow Visualization*, Aug. 8-12, 2004, Notre Dame, IN

6. M. W. Plesniak, F. Shu, P. E. Sojka, S. H. Frankel, "Flow Control and Design of Environmentally Benign Spray Systems," (invited paper) Technology for a Sustainable Environment (TSE) session, *Annual American Institute of Chemical Engineers (AIChE) 2002 Conference*, November 3 - 8, 2002, Indianapolis, IN
7. F. Shu, M. W. Plesniak, P. E. Sojka, "Indeterminate Origin Nozzles to Control Jets", *56th DFD conference of the American Physics Society*, Nov. 2003, Meadowlands, NJ
8. F. Shu, M. W. Plesniak, P. E. Sojka, "Control of an Impinging Jet Emanating from a Nozzle of Indeterminate Origin", *55th DFD conference of the American Physics Society*, Nov. 2002, Dallas, TX
9. F. Shu, M. W. Plesniak, P. E. Sojka, "Structure of Impinging Jet Issuing from a Nozzle of Indeterminate Origin with Applications to Improving Transfer Efficiency for Spray Systems", *2002 Painting Technology Workshop (PTW2002)*, Lexington, KY, June, 2002
10. F. Shu, C. Feng, S. He, B. Xu, "The Study of 3D Object's Profile Detection Technology", *Journal of Experimental Mechanics (China)*, Vol. 15, No. 2, June, 2000
11. K. Qian, F. Shu, X. Wu, "Determination of the Best Phase Step of the Carré Algorithm in Phase Shifting Interferometry", *Measurement Science and Technology*, 11 No. 8 (August 2000) 1220-1223
12. H. Miao, F. Shu, X. Wu, "A Non-linear Filtering Method Based on Wavelet Analysis and Its Application to Speckle Fringe Pattern", *Journal of Experimental Mechanics*, vol. 14, No. 3, Sep. 1999
13. D. Lu, X. Kong, F. Shu, "Wellbore Transient Pressure Behavior of Composite Dual-Porosity in the Kinds of Outside Boundary", *Journal of Hydrodynamics*, Ser. A vol. B No. 2, P155

REFERENCES:

- **Dr. James F. Antaki** (*Postdoc Advisor*)
Professor of Biomedical Engineering
Carnegie Mellon University
Email: antaki@andrew.cmu.edu Tel: 412-608-2864
- **Dr. Michael W. Plesniak** (*PhD Advisor*)
Professor of Mechanical Engineering
Purdue University and Polytechnics University
Email: plesniak@widget.ecn.purdue.edu or plesniak@poly.edu Tel: 718-260-3625
- **Dr. Paul E. Sojka** (*PhD Co. Advisor*)
Professor of Mechanical Engineering
Purdue University
Email: Sojka@widget.ecn.purdue.edu Tel: 765-494-4665