

## Zhi Shang, Ph.D.

Research Associate  
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Immigration Status (USA): Green card holder

### Work address:

High Performance Research Computing  
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APT 165  
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### Qualifications:

- Experiences in CFD (computational fluid dynamics) and NHT (numerical heat transfer) over 15 years.
- Experiences in HPC (high performance computing) over 10 years.
- Parallel Programming using MPI, OpenMP, OpenACC and CUDA (GPUs), vectorization (MICs).
- Multiphase flow modeling of Mixture, Euler-Euler and Eulerian-Lagrangian approaches.
- Interface dynamics and phase change using VOF, Level Set and CLSVOF with heat transfer.
- Discrete phase modeling with DPM (discrete particle model) and DEM (discrete element method).
- Multi-physics simulations through FSI (fluid-structure interaction) and LBM (lattice Boltzmann method).
- Hypersonic (shock wave capture) and rarefied flows (3D DSMC-direct simulation Monte Carlo).

### GitHub Master Repository Projects:

• CFD	Lattice Boltzmann method for computational fluid dynamics with BGK and MRT collision model	C++	<a href="https://github.com/zhishang80/OpenLBM">https://github.com/zhishang80/OpenLBM</a>
• MPI	Finite difference method for heat transfer with MPI-2 parallel I/O and MPI-3 neighborhood collectives	Fortran90	<a href="https://github.com/zhishang80/HeatTransfer">https://github.com/zhishang80/HeatTransfer</a>
• Hybrid OpenMP/OpenACC/MPI	Hybrid OpenMP/MPI with OpenMP-2,3,4 under MPI thread initializing; Hybrid OpenACC/MPI with multi GPUs and OpenMP	C	<a href="https://github.com/zhishang80/MatrixMulMatrix_MPI">https://github.com/zhishang80/MatrixMulMatrix_MPI</a>
• Hybrid Cuda/MPI	Hybrid Cuda/MPI with non-shared and shared GPU memory usage	Cuda	<a href="https://github.com/zhishang80/MatrixMulMatrix_Cuda_MPI">https://github.com/zhishang80/MatrixMulMatrix_Cuda_MPI</a>
• Python/OpenFOAM	Python picking up the residuals from OpenFOAM log output file and drawing the residual curves	Python	<a href="https://github.com/zhishang80/Python_OpenFOAM_process">https://github.com/zhishang80/Python_OpenFOAM_process</a>

### Technical Skills:

- *Operating systems*: Linux, Windows
- *Website programming*: HTML, JavaScript, PHP
- *Parallel programming*: MPI, OpenMP, OpenACC and CUDA (GPUs), Vectorization (MICs)
- *High performance computing*: Valgrind, Perf, IPM, VTune, TAU, TotalView
- *Scientific computational languages*: C++, C, Fortran, Matlab, Python
- *Software for engineering applications*:
  - CAD geometry tool*: Solidworks, CATIA, Unigraphics, AutoCAD, Salome, Blender
  - CFD pre-processing tool*: ICEM-CFD, snappyHexMesh, Gridgen, Salome, GiD, Gmsh
  - CFD solver tool*: OpenFOAM, FLUENT, CFX, STAR-CD, STAR-CCM+, Code\_Saturne, Telemac
  - CFD post-processing tool*: Paraview, Tecplot, EnSight, FieldView, VisIt, Maya, Blender, Matplotlib

**Educations:**

- Undergraduate: Xi'an Jiaotong University, Xi'an, China, Thermal Engineering, BS, 1989-1993.
- Post graduate: Xi'an Jiaotong University, Xi'an, China, Thermal Engineering, MS, 1993-1996.
- Post graduate: Xi'an Jiaotong University, Xi'an, China, Nuclear Engineering, PhD, 1996-2000.
- Post-Doc: Tsinghua University, Beijing, China, Thermal Engineering, 2001-2003.

**Research Achievements:**

- Founder of centrifugal correction drag force model for multiphase flow.
- Founder of Lagrangian algebraic slip mixture model for multiphase flow.
- Founder of artificial intelligence CFD with directly solving PDE method.

**Academic Activities (Member and Editor):**

- Member of APS.
- Editorial board member of International Journal of Chemical Engineering and Processing (<http://chemical.journalspub.info/index.php/JCEP/about/editorialTeam>).

**Professional Work Experiences:**

- *Research Associate, HPRC, TAMU, USA, July 2016-December 2017:*  
high performance computing (HPC) at Intel Xeon Phi Knights Landing Cluster (KNL) using OpenFOAM (C++);  
coupling DPM and DEM with VOF for multiphase flow using OpenFOAM (C++);  
DPM and DEM modeling for porous media based on OpenFOAM (C++);  
OpenFOAM for complex fluid flow with GPU application (C++).
- *Research Associate, CCT, LSU, USA, March 2015-June 2016:*  
high performance computing (HPC) at Intel Xeon Phi Coprocessors (KNC) using OpenFOAM (C++);  
DPM and DEM modeling for porous media based on OpenFOAM (C++);  
OpenFOAM for complex fluid flow with GPU application (C++).
- *Scientist III, IHPC, A-STAR, Singapore, October 2011-February 2015:*  
parallelizing and optimizing OpenFOAM for dealing with large scale high performance computing (C++);  
parallelizing and optimizing 3D CFD codes of VOF, level set and CLSVOF for multiphase flows (C++ and Fortran);  
parallelizing and optimizing 3D LBM code for multiphase flows (C++, Fortran and Matlab);  
Lagrangian algebraic slip mixture model for multiphase flows;  
interface dynamics of multiphase flows;  
OpenFOAM for complex fluid flows (C++).
- *Computational Scientist, Daresbury Laboratory, STFC, UK, April 2009-September 2011:*  
research and development on large scale CFD parallel computing program towards the Exascale (C and Fortran);  
research and development on supercavitation around high speed submarine using OpenFOAM (C++);  
hybrid MPI and OpenMP parallel CFD programming for finite element method (Fortran);  
complex fluid flow using OpenFOAM on chemical reactions and combustions (C++);  
research and development on hypersonic rarefied flows using OpenFOAM (C++).
- *Research Associate, Aeronautical Engineering, Kingston University London, UK, December 2007-March 2009:*  
in-house hypersonic CFD code development for LES and DNS with MPI (Fortran);  
CFD with heat transfer of supercritical pressurized water (SCWR) (Fortran).
- *Collaborative Researcher, Aeronautics, Astronautics and Computational Engineering Unit, Faculty of Engineering and the Environment, University of Southampton, UK, December 2007-March 2009:*  
developing compressible CFD code (SBLI) on DNS and LES for hypersonic flows (Fortran).
- *Visiting Fellow, Aeronautical Engineering, Kingston University London, UK, February 2007-November 2007:*  
development of novel drift-flux model for two-phase flows (C and C++);  
teaching assistant on CFD (Matlab and Fortran).
- *Research Fellow, Nuclear Professional School, University of Tokyo, Japan, March 2006-February 2007:*  
CFD on aided design of supercritical pressurized water-cooled fast nuclear reactor (SWFR).
- *Part-time CFD Engineer, ANSYS CFX-China, Shanghai, China, March 2005-March 2006:*  
research and application of CFD (C++ and Fortran).

- *Associate Professor, School of Nuclear Science and Engineering, Shanghai Jiaotong University, China, June 2003-December 2008:*  
teaching and research (Matlab, Fortran, C and C++).
- *Postdoctoral Research Fellow, Department of Thermal Engineering, Tsinghua University, China, May 2001-May 2003:*  
multiphase flow modeling and code developing (C and C++).
- *Research Assistant, Department of Nuclear Engineering, Xi'an Jiaotong University, China, August 2000-April 2001:*  
nuclear reactor thermal dynamics computing (Matlab, Fortran, C and C++).

#### **Academic Activities (Peer Reviewer for Academic Journals):**

1. Advanced Powder Technology
2. Advances in Mechanical Engineering
3. AIChE Journal
4. Annals of Nuclear Energy
5. Applied Mathematical Modelling
6. Asian Journal of Mathematics and Computer Research
7. Biomechanics and Modeling in Mechanobiology
8. British Journal of Applied Science & Technology
9. British Journal of Mathematics & Computer Science
10. Computers and Fluids
11. Computer Physics Communications
12. Engineering Applications of Artificial Intelligence
13. Engineering Applications of Computational Fluid Mechanics
14. Experimental Thermal and Fluid Science
15. Heat and Mass Transfer
16. Heat Transfer Engineering
17. International Journal for Numerical Methods in Engineering
18. International Journal of Computational Methods
19. International Journal of Engineering, Science and Technology
20. International Journal of Heat and Mass Transfer
21. International Journal of Multiphase Flow
22. International Journal of Modeling, Simulation and Scientific Computing
23. International Journal of Thermal Science
24. Journal of Basic and Applied Research International
25. Journal of Engineering and Technology Research
26. Journal of Engineering Mechanics
27. Journal of Geography, Environment and Earth Science International
28. Journal of Heat Transfer
29. Journal of Power Technologies
30. Minerals
31. Molecular Simulation
32. Multidiscipline Modeling in Materials and Structures
33. Open Journal of Applied Science
34. Particulate Science and Technology
35. Powder Technology
36. Progress in Computational Fluid Dynamics

#### **Academic Activities (Proposals for Funding):**

- *Accepted:* Large scale CFD simulations on multiphase flows in oil & gas industry using Intel Knights Landing computing environment  
Grant Type: External  
Supporter: Intel® Company at parallel computing centers (Intel® PCC) program  
Principal Investigator: Honggao Liu (Director at HPRC of Texas A&M University, USA)  
Senior Investigator: **Zhi Shang**

- Total award amount: \$150,000  
 Total award period covered: March 2016-December 2017
- *Accepted:* FPSO MV26 exhaust and vent gas dispersion study  
 Grant Type: External  
 Supporter: MODEC offshore production systems (S) Pte. Ltd ([www.modec.com](http://www.modec.com))  
 Principal Investigator: Jing Lou (Director of Fluid Dynamics at IHPC, A\*STAR, Singapore)  
 Co-Principal Investigator: Changwei Kang, **Zhi Shang**, etc.  
 Total award amount: S\$50,000  
 Total award period covered: July 2013-September 2013
  - *Accepted:* CFD analysis on exhaust gas discharge from FPSO MV24 into air  
 Grant Type: External  
 Supporter: MODEC offshore production systems (S) Pte. Ltd ([www.modec.com](http://www.modec.com))  
 Principal Investigator: Jing Lou (Director of Fluid Dynamics at IHPC, A\*STAR, Singapore)  
 Co-Principal Investigator: Changwei Kang, **Zhi Shang**, etc.  
 Total award amount: S\$30,000  
 Total award period covered: June 2012-July 2012
  - *Accepted:* Development of novel drift-flux model for two-phase turbulent flow  
 Grant Type: External  
 Supporter: The Leverhulme Trust Awards of UK  
 Principal Investigator: Yufeng Yao (Lecture at Mechanical Engineering of Kingston University, UK)  
 Senior Investigator: **Zhi Shang**  
 Total award amount: £20,000  
 Total award period covered: February 2007-November 2007
  - *Accepted:* A novel multiphase flow model development based on mixture modeling  
 Grant Type: External  
 Supporter: Shanghai university select and train outstanding young teachers in special research project fund of China  
 Principal Investigator: **Zhi Shang**  
 Total award amount: ¥20,000  
 Total award period covered: January 2006-December 2006
  - *Accepted:* Natural circulation reactor system design research  
 Grant Type: Internal  
 Supporter: Shanghai Jiaotong University at Participation Research Program (PRP)  
 Principal Investigator: **Zhi Shang**  
 Total award amount: ¥1,000  
 Total award period covered: February 2005-July 2005
  - *Accepted:* A mechanism research of vapor-liquid two-phase flow and boiling heat transfer in a narrow channel using lattice Boltzmann method  
 Grant Type: Internal  
 Supporter: Faculty Research Foundation for Youth of Shanghai Jiaotong University  
 Principal Investigator: **Zhi Shang**  
 Total award amount: ¥10,000  
 Total award period covered: January 2005-December 2005
  - *Accepted:* Investigation of film boiling thermal hydraulics around high temperature particles under film boiling condition in vapor explosion  
 Grant Type: External  
 Supporter: National Natural Scientific Funds of China (No.50376036)  
 Principal Investigator: Yanhua Yang (Professor at School of Mechanical Engineering of Shanghai Jiaotong University, China)  
 Co-Principal Investigator: **Zhi Shang** etc.  
 Total award amount: ¥250,000  
 Total award period covered: January 2004-December 2006

**Academic Activities (Teaching):**

- Computational fluid dynamics (CFD)  
*Teaching Affiliation:* Kingston University, UK  
*Teaching Lecturers:* Yufeng Yao; **Zhi Shang**  
*Teaching Object:* Undergraduate Students  
*Course Contents:* Fundamentals and applications of CFD  
*Sessions:* November 2007-December 2007
- Gas liquid two phase flow and boiling heat transfer  
*Teaching Affiliation:* Shanghai Jiatong University, China  
*Teaching Lecturers:* **Zhi Shang**  
*Teaching Object:* Graduate Students (Master and PhD)  
*Course Contents:* Fundamentals and applications of two phase flow and boiling heat transfer  
*Sessions:* September 2005-January 2006
- Reactor secondary loop system  
*Teaching Affiliation:* Shanghai Jiatong University, China  
*Teaching Lecturers:* **Zhi Shang**  
*Teaching Object:* Guangdong Nuclear Power Group trainees  
*Course Contents:* Functions and safeties of secondary loops in nuclear reactors  
*Sessions:* August 2005-October 2005
- Fundamentals of multiphase flow  
*Teaching Affiliation:* Shanghai Jiatong University, China  
*Teaching Lecturers:* **Zhi Shang**  
*Teaching Object:* Undergraduate Students  
*Course Contents:* Fundamentals and applications of multiphase flows  
*Sessions:* February 2005-May 2005
- Fundamentals of multiphase flow  
*Teaching Affiliation:* Shanghai Jiatong University, China  
*Teaching Lecturers:* **Zhi Shang**  
*Teaching Object:* Guangdong Nuclear Power Group trainees  
*Course Contents:* Fundamentals and applications of multiphase flows in nuclear reactors  
*Sessions:* October 2004-December 2004
- Fundamentals of multiphase flow  
*Teaching Affiliation:* Shanghai Jiatong University, China  
*Teaching Lecturers:* **Zhi Shang**  
*Teaching Object:* Undergraduate Students  
*Course Contents:* Fundamentals and applications of multiphase flows  
*Sessions:* February 2004-April 2004
- Fundamentals of multiphase flow  
*Teaching Affiliation:* Shanghai Jiatong University, China  
*Teaching Lecturers:* **Zhi Shang**  
*Teaching Object:* Undergraduate Students  
*Course Contents:* Fundamentals and applications of multiphase flows  
*Sessions:* September 2003-November 2003

**Academic Activities (Supervisor and Mentor):**

- *Project:* Fluid Flow through Porous Media Simulation Scalability with OpenFOAM and MPI  
*Affiliation:* Louisiana State University, USA  
*Mentors:* Mayank Tyagi; **Zhi Shang**  
*Number of Student:* 1 (Undergraduate Student)  
*Sessions:* July 2015-August 2015

- *Project:* CFD Simulations Using Lattice Boltzmann Method (LBM)  
*Affiliation:* Shanghai Jiaotong University, China  
*Mentors:* **Zhi Shang**  
*Number of Student:* 2 (Undergraduate Student)  
*Sessions:* March 2005-July 2005
- *Project:* Nuclear Reactor Thermal Hydraulic Calculation  
*Affiliation:* Shanghai Jiaotong University, China  
*Mentors:* **Zhi Shang**  
*Number of Student:* 2 (Undergraduate Student)  
*Sessions:* March 2004-July 2004
- *Project:* Mechanism of Thermal Stress in Nuclear Reactors  
*Affiliation:* Shanghai Jiaotong University, China  
*Supervisors:* **Zhi Shang**  
*Number of Student:* 1 (Master Student)  
*Sessions:* September 2003-December 2005
- *Project:* A Novel Drift Flux Model Development for Two-phase Flow  
*Affiliation:* Tsinghua University, China  
*Supervisors:* Yan Ruichang  
*Mentors:* **Zhi Shang**  
*Number of Students:* 2 (Master Student)  
*Sessions:* May 2001-May 2003

#### **Publications:**

##### • *Journals:*

1. **Zhi Shang**. A Centrifugal Correction Drag Force Model for Gas Liquid-Droplet Jet Flows. Journal of Applied Physical Science International, available (in press) at <http://www.ikpress.org/articles-press/33>.
2. **Zhi Shang**, Honggao Liu, James A. Lupo. Evaluation of hybrid MPI-OpenMP on discrete particle modeling for large scale parallel computing with OpenFOAM. Asian Journal of Mathematics and Computer Research, available (in press) at <http://www.ikpress.org/articles-press/44>.
3. Y.F. Yap, H.Y. Li, J. Lou, L.S. Pan, **Z. Shang**. Numerical modeling of three-phase flow with phase change using the level-set method. International Journal of Heat and Mass Transfer, 115, 2017, 730-740.
4. H.Y. Li, Y.F. Yap, J. Lou, J.C. Chai, **Z. Shang**. Conjugate Heat Transfer in Stratified Two-Fluid Flows with a Growing Deposit Layer. Applied Thermal Engineering, 113, 2017, 215-228.
5. **Zhi Shang**, Jing Lou, Hongying Li. Simulations of flow transitions in a vertical pipe using coupled level set and VOF method. International Journal of Computational Methods, 14(2), 2017, Article ID 1750013, 17 pages.
6. **Zhi Shang**. A new centrifugal correction drag force model for gas solid-particle two-phase flow. Powder Technology, 303, 2016, 124-129.
7. H.Y. Li, Y.F. Yap, J. Lou, **Z. Shang**. Numerical simulation of three-fluid stratified flow using the level-set method. International Journal of Computational Methods, 13(6), 2016, Article ID 1650033, 21 pages.
8. **Zhi Shang**, Baili Zhang, Ming Cheng, Jing Lou, Xiaodong Niu. Parallelization of 3D immersed boundary lattice Boltzmann method for large scale solid particle suspension flow using MPI and OpenMP. Asian Journal of Mathematics and Computer Research, 10(2), 2016, 165-178.
9. **Zhi Shang**, Jing Lou, Hongying Li. A multi-dimensional Lagrangian algebraic slip mixture model for bubble column reactors. Applied Mathematical Modelling, 41(1), 2016, 208-217.
10. H.Y. Li, Y.F. Yap, J. Lou, **Z. Shang**. Numerical investigation of heat transfer in three-fluid stratified flows. International Journal of Heat and Mass Transfer, 89, 2015, 576-587.
11. **Zhi Shang**, Jing Lou, Hongying Li. A new multidimensional drift flux mixture model for gas-liquid droplet two-phase flow. International Journal of Computational Methods, 12(4), 2015, Article ID 1540001, 12 pages.
12. **Zhi Shang**. A novel drag force coefficient model for gas-water two-phase flows under different flow patterns. Nuclear Engineering and Design, 288, 2015, 208-219.
13. **Zhi Shang**, Jing Lou, Hongying Li. CFD analysis of bubble column reactor under gas-oil-water-solid four-phase flows using Lagrangian algebraic slip mixture model. International Journal of Multiphase Flow, 73, 2015, 142-154.
14. H.Y. Li, Y.F. Yap, J. Lou, **Z. Shang**. Numerical modelling of three-fluid flow using the level-set method. Chemical

- Engineering Science, 126, 2015, 224-236.
15. **Zhi Shang**, Jing Lou, Hongying Li. CFD of transition from bubbly flow to slug flow in vertical pipe. *International Journal of Chemical Engineering and Processing*, 1(1), 2015, 14-20.
  16. H.Y. Li, Y.F. Yap, J. Lou, J.C. Chai, **Z. Shang**. Numerical investigation of conjugated heat transfer in a channel with a moving depositing front. *International Journal of Thermal Sciences*, 88, 2015, 136-147.
  17. **Zhi Shang**. Impact of mesh partitioning methods in CFD for large scale parallel computing. *Computers and Fluids*, 103, 2014, 1-5.
  18. **Zhi Shang**, Jing Lou, Hongying Li. CFD of dilute gas-solid two-phase flow using Lagrangian algebraic slip mixture model. *Powder Technology*, 266, 2014, 120-128.
  19. **Zhi Shang**. High performance computing for flood simulation using Telemac based on hybrid MPI/OpenMP parallel programming. *International Journal of Modeling, Simulation, and Scientific Computing*, 5(4), 2014, Article ID 1472001, 13 pages.
  20. **Zhi Shang**, Jing Lou, Hongying Li. Numerical simulation of water jet flow using diffusion flux mixture model. *Journal of Fluids*, Volume 2014, Article ID 193215, 6 pages.
  21. **Zhi Shang**, Ming Cheng, Jing Lou. Parallelization of lattice Boltzmann method for a drop impact on a wetted solid wall. *International Journal of Modeling, Simulation, and Scientific Computing*, 5(2), 2014, Article ID 1350024, 13 pages.
  22. **Zhi Shang**. Numerical investigations of supercavitation around blunt bodies of submarine shape. *Applied Mathematical Modelling*, 37 (20-21), 2013, 8836-8845.
  23. **Zhi Shang**, Jing Lou, Hongying Li. A novel Lagrangian algebraic slip mixture model for two-phase flow in horizontal pipe. *Chemical Engineering Science*, 102, 2013, 315-323.
  24. Hongying Li, Jing Lou, **Zhi Shang**, Hui Tang. Simulation of bubbly flow in a vertical pipe using discrete phase model. *International Journal of Aerospace and Lightweight Structures*, 3(2) 2013, 291-301.
  25. **Zhi Shang**. Large scale CFD parallel computing dealing with massive mesh. *Journal of Engineering*, Volume 2013, Article ID 850148, 6 pages.
  26. **Zhi Shang**, Shuo Chen. 3D DSMC simulation of rarefied gas flows around a space crew capsule using OpenFOAM. *Open Journal of Applied Sciences*, 3(1), 2013, 35-38.
  27. **Zhi Shang**. Performance analysis of large scale parallel CFD computing based on Code\_Saturne. *Computer Physics Communications*, 184(2), 2013, 381-386.
  28. **Zhi Shang**, David R. Emerson, Xiaojun Gu. Numerical investigations of cavitation around a high speed submarine using OpenFOAM with LES. *International Journal of Computational Methods*, 9(3), 2012, Article ID 1250040, 14 pages.
  29. **Zhi Shang**, Simon Lo. CFD in supercritical water-cooled nuclear reactor (SCWR) with horizontal tube bundles. *Nuclear Engineering and Design*, 241(11), 2011, 4427-4433.
  30. Y. Fournier, J. Bonelle, C. Moulinec, **Z. Shang**, A. Sunderland, J. Uribe. Optimizing Code Saturne computations on Petascale systems. *Computers & Fluids*, 45(1), 2011, 103-108.
  31. **Zhi Shang**, Shuo Chen. Numerical investigation of diameter effect on heat transfer of supercritical water flows in horizontal round tubes. *Applied Thermal Engineering*, 31(4), 2011, 573-581.
  32. Junli Gou, **Zhi Shang**, Yuki Ishiwarari, Yoshiaki Oka, Masanori Yamakawa, Satoshi Ikejiri. CFD analysis of heat transfer in subchannels of a super fast reactor. *Nuclear Engineering and Design*, 240(7), 2010, 1819-1829.
  33. Zhi Shang, Simon Lo. Numerical investigation of supercritical water-cooled nuclear reactor in horizontal tube bundles. *Nuclear Engineering and Design*, 240(4), 2010, 776-782.
  34. **Zhi Shang**. CFD investigation of vertical rod bundles of supercritical water-cooled nuclear reactor. *Nuclear Engineering and Design*, 232(2), 2009, 157-163.
  35. **Zhi Shang**, Yufeng Yao, Shuo Chen. Numerical investigation of pressure effect on heat transfer of supercritical water flows in a horizontal round tube. *Chemical Engineering Science*, 63(16), 2008, 4150-4158.
  36. Liangzhi CAO, Yoshiaka OKA, Yuki ISHIWATARI, **Zhi SHANG**. Fuel, core design and subchannel analysis of a superfast reactor. *Journal of Nuclear Science and Technology*, 45(2), 2008, 138-148.
  37. **Zhi Shang**. CFD of turbulent transport of particle behind a backward-facing step using a new model — k- $\epsilon$ -Sp. *Applied Mathematical Modelling*, 29(9), 2005, 885-901.
  38. **Zhi Shang**. Application of artificial intelligence CFD based on neural network in vapor-water two-phase flow. *Engineering Applications of Artificial Intelligence*, 18(8), 2005, 663-671.
  39. Yang Ruichang, Zhou Weiduo, Fukuda Kenji, Ju Zejian, **Shang, Zhi**. Modified diffusion flux model for analysis of turbulent gas-particle two-phase flows. *Tsinghua Sci. Tech.*, 10(2), 2005, 189-195.



40. **Zhi Shang**, Ruichang Yang, Xuewu Cao, Yanhua Yang. An investigation of two-phase flow instability using wavelet signal extraction technique. *Nuclear Engineering and Design*, 232(2), 2004, 157-163.
41. **Zhi Shang**, Ruichang Yang, Kenji Fukuda, Dingkai Li, Xin He. Experiment and simulation using diffusion flux model for gas-particle two-phase flow in a suspension bed. *Chemical Engineering Science*, 59(7), 2004, 1505-1514.
42. **SHANG Zhi**, YANG Ruichang, FUKUDA Kenji, ZHONG Yong, JU Zejian. The numerical simulation of gas-particle two-phase flow in a suspension bed using diffusion flux model. *Chinese Journal of Chemical Engineering*, 11(5), 2003, 497-503.

• *Conferences:*

1. **Zhi Shang**, Honggao Liu. High Performance Computing on Multiphase Flows in Oil Reservoir at Intel Xeon Phi Knights Landing Processors. Poster at Texas A&M University booth, 30<sup>th</sup> Supercomputing Conference (SC17), Denver, Colorado, November 13 - 16, 2017, USA. ([poster](#))
2. **Zhi Shang**, Honggao Liu, James A. Lupo. CFD High Performance Computing in Oil Reservoirs at Intel Xeon Phi. The 2<sup>nd</sup> Annual Texas A&M Conference on Energy, College Station, Texas, September 25-27, 2017, USA. ([presentation](#))
3. **Zhi Shang**, Honggao Liu. Simulating Multiphase Flows in Porous Media Using OpenFOAM on Intel Xeon Phi Knights Landing Processors. Practice & Experience in Advanced Research Computing (PEARC17), New Orleans, Louisiana, July 9 - 13, 2017, USA. ([presentation](#) + [article](#))
4. **Zhi Shang**, Honggao Liu. High Performance Computing of Multiphase Flow in Porous Media Network using OpenFOAM. Texas A&M Research Computing Week, College Station, Texas, June 5 - 9, 2017, USA ([poster](#))
5. **Zhi Shang**, Honggao Liu. High Performance Computing at Intel Xeon Phi Knights Landing Cluster with OpenFOAM. Poster at Texas A&M University booth, 29<sup>th</sup> Supercomputing Conference (SC16), Salt Lake City, Utah, November 13 - 18, 2016, USA. ([poster](#))
6. **Zhi Shang**, Mayank Tyagi, James A. Lupo, Honggao Liu, Krishnaswamy Nandakumar, Karsten Thompson. Large Scale CFD Simulations of Particulate Flows in Porous Media. Poster at Louisiana State University booth, 27<sup>th</sup> Supercomputing Conference (SC15), Austin, Texas, November 15 - 20, 2015, USA. ([poster](#))
7. **Zhi Shang**, Honggao Liu, Krishnaswamy Nandakumar, Mayank Tyagi, James A. Lupo, Karsten Thompson. Discrete Particle Model for Porous Media Flow using OpenFOAM at Intel Xeon Phi Coprocessor. American Physical Society, Division of Fluid Dynamics 68<sup>th</sup> Annual Meeting, Boston, Massachusetts, November 22 - 24, 2015, USA. ([presentation](#))
8. **Zhi Shang**. High Performance Computing at Intel Xeon Phi Coprocessor for Discrete Particle Model of OpenFOAM. Presentation at HPC theater, Society of Exploration Geophysicists (SEG), International Exposition and 85<sup>th</sup> Annual Meeting, New Orleans, Louisiana, October 18 - 23, 2015, USA. ([presentation](#))
9. **Zhi Shang**, Honggao Liu, Krishnaswamy Nandakumar, Mayank Tyagi, James A. Lupo, Karsten Thompson. High Performance Computing at Intel Xeon Phi Coprocessor Using Native and Symmetric Modes for Discrete Particle Model of OpenFOAM. 3<sup>rd</sup> Annual EPIC Workshop on Enabling Process Innovation through Computation, Louisiana State University, Baton Rouge, Louisiana, May 1, 2015, USA. ([poster](#))
10. Hongying Li, Jing Lou, **Zhi Shang**. Numerical Modelling of Three-Fluid Flow Using The Level-set Method. American Physical Society, Division of Fluid Dynamics 67<sup>th</sup> Annual Meeting, San Francisco, California, November 23 - 25, 2014, USA. ([presentation](#))
11. Baili Zhang, Ming Cheng, **Zhi Shang**, Jing Lou. An Immersed Boundary-Lattice Boltzmann Approach to the Direct Numerical Simulation of Complex Particulate Flows. American Physical Society, Division of Fluid Dynamics 67<sup>th</sup> Annual Meeting, San Francisco, California, November 23 - 25, 2014, USA. ([presentation](#))
12. **Zhi Shang**, Hongying Li, Jing Lou. A multi-dimensional drift flux mixture model for gas-droplet two-phase flow. 5<sup>TH</sup> ASIA PACIFIC CONGRESS ON COMPUTATIONAL MECHANICS & 4<sup>TH</sup> INTERNATIONAL SYMPOSIUM ON COMPUTATIONAL MECHANICS (APCOM2013 and ISCM 2013), 11 - 14 December 2013, Singapore. ([presentation](#) + [article](#))
13. **Zhi Shang**, Jing Lou, Hongying Li. A new drag force model based on drift flux for gas-particle two-phase flow. American Physical Society, Division of Fluid Dynamics 66<sup>th</sup> Annual Meeting, Pittsburgh, Pennsylvania, November 24 - 26, 2013, USA. ([presentation](#))
14. **Zhi Shang**. A CFD investigation of cavitation around a submarine under water. Proceedings of the 8<sup>th</sup> International Symposium on Cavitation (CAV2012), 14 - 16 August 2012, Singapore. ([presentation](#) + [article](#))
15. M.B. Liu, J.R. Shao, **Z. Shang**. SPH modeling of supercavity induced by underwater high speed objects. Proceedings of the 8<sup>th</sup> International Symposium on Cavitation (CAV2012), 14 - 16 August 2012, Singapore. (



16. **Zhi Shang**. Developing the TELEMAT system for HEVToR (phase 2b & beyond). HECToR Distributed CSE Support Technical Meeting, 4 - 5 October 2011, Manchester, UK. ([presentation](#))
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