OMID AZADEH RANJBAR

Department of Mechanical Engineering
University of Alabama
Tuscaloosa, AL 35487, USA

Tel: +1 (917) 678-1123
Email: oazadehranjbar@crimson.ua.edu

EDUCATION

- **B.Sc. (2009-2013)**
  Department of Mechanical Engineering
  Azad University, Tehran, Iran.
- **Ph.D. (2015- to date)**
  Department of Mechanical Engineering
  University of Alabama, Tuscaloosa, USA

RESEARCH INTERESTS

- Fluid mechanics and computational fluid dynamics
- Multiscale and multiphysics simulations including continuum, kinetic, and molecular dynamics
- Laser-material interactions and laser plume expansion.
- Selective laser melting of metal powders.
- Multiphase flows, heat and mass transfer.
- Rarefied gas dynamics and direct simulation Monte Carlo method.

RESEARCH EXPERIENCES

- Research assistant, University of Alabama, Tuscaloosa, AL, USA. (2015- present)
  "Hydrodynamic and kinetic simulations of laser-induced plasma plume expansion and plasma shielding"
  - Development of an industrial software package for simulations of the laser ablation process.
  - Development of a combined numerical 1D thermal model of the laser heating and ablation of a metal target with a 1D hydrodynamic code for the plasma plume expansion induced by a single high power ns laser pulse.
  - Development of a 1D/2D kinetic model based on direct simulation of Monte Carlo method (DSMC) accounting for equilibrium ionization and plasma shielding effect coupled with a 1D/2D thermal model for a metal target.
  - Study of the laser-induced copper evaporation into a background gas or vacuum.

- Research assistant, Azad University, Tehran, Iran, (2011- 2013)
  "Particle Simulation of Subsonic Rarefied Gas Flow Induced by Thermal Loading in Microgeometries"
  - Development of a DSMC code for a non-isothermal condition to explore the effect of the thermal transpiration and thermal creep in a subsonic rarified gas flow induced by the thermal loading upon the different geometric walls.
  - Study of the heat transfer and fluid dynamic characteristics of gas flows in Knudsen compressor.

- Research assistant, Rosoob Ab Pouya Research & Chemical Co. Tehran, Iran, (2010- 2012)
  - Assessment of Procedures to Prepare Industrial Deionized Water.
  - Assessment of Methods Eliminating Dissolved Gas from Liquids.
  - Designing & Manufacturing Machines to Desalinate Water by Reverse Osmosis.

INTERNSHIPS

- Rosoob Ab Pouya Research & Chemical Co., Tehran, Iran (Jun. 2010 to Aug. 2010) and (Jun. 2011 to Aug. 2011)

COMPUTER SKILS

- Operating Systems — Windows, Linux
- Programming Languages — C++, Matlab, Fortran
- Software — Abaqus, Solid Works, Microsoft Office

PUBLICATIONS

- Palya, A. **Ranjbar** O. A., Lin, Z., and Volkov, A. N., Effect of the background gas pressure on the effectiveness of laser-induced material removal from deep cavities in irradiated targets, Applied Physics A., 2017 (Accepted)
- **Ranjbar**, O. A., and Volkov, A. N., Kinetic and hydrodynamic simulations of laser-induced plume expansion, Proc. Sixteenth Annual Early Career Technical Conference ECTC 2016, November 5 - 6, 2016, Birmingham, Alabama USA.

CONFERENCE PRESENTATIONS

- **Ranjbar**, O.A., Lin, Z., Volkov, A. N., Kinetic and hydrodynamic simulations of laser-induced plume expansion and the plasma shielding effect, ASME International Mechanical Engineering Congress and Exposition 2017 IMECE, Tampa, Florida, USA, November 2-9, 2017
- **Ranjbar**, O. A., Lin Z., Volkov, A. N., Kinetic and hydrodynamic simulations of the plasma shielding effect during laser ablation of metal targets by short laser pulses, The 14th Conference on Laser Ablation (COLA-2017), Marseille, France, September 3-8, 2017.
- Palya, A., **Ranjbar**, O. A., Volkov, A. N., Effectiveness of material removal during pulsed laser drilling of high aspect ratio cavities, The 14th Conference on Laser Ablation (COLA-2017), Marseille, France, September 3-8, 2017.
- Volkov, A. N., **Ranjbar**, O. A., Lin Z., Atomistic and macroscopic simulations of material removal rates under conditions of laser ablation of metal targets by short laser pulses The 14th Conference on Laser Ablation (COLA-2017), Marseille, France, September 3-8, 2017.
- **Ranjbar**, O.A., Volkov, A. N., Kinetic and hydrodynamic simulations of laser-induced plume expansion, Proc. Sixteenth Annual Early Career Technical Conference ECTC 2016, November 5-6, 2016, Birmingham, Alabama USA.
- Volkov, A.N., **Ranjbar**, O., Silverstein, G., A DSMC-based method for kinetic simulations of laser-induced plasma plume expansion, The 7th DSMC Workshop DSMC15, Kapaa, Kauai, Hawaii, USA, September 13-17, 2015.
- Volkov, A. N., Silverstein, G., **Ranjbar**, O., Lin Z., Non-equilibrium effects in laser-induced plasma plumes, The 13th Conference on Laser Ablation (COLA-2015), Cairns, Australia, 31 August – 4 September, 2015.
- Lin, Z., Matsumoto, H., Kleinert, J., Concina, S., Otto, A., Vázquez, R. G., Bielak, R., Tatra, S., Volkov, A. N., Silverstein, G., **Ranjbar**, O., Experimental and Numerical Studies of Nanosecond Laser Processing in Industrial Micromachining Applications, The 13th Conference on Laser Ablation (COLA-2015), Cairns, Australia, 31 August – 4 September, 2015.
- Volkov, A.N., Silverstein, G., **Ranjbar**, O., Comparison of kinetic and continuum model for simulations of laser-induced plasma plumes, Progress In Electromagnetics Research Symposium PIERS 2015, Prague, Czech Republic, July 6-9, 2015.

REFERENCES

- **Dr. Alexey N. Volkov**
  Assistant Professor, Department of Mechanical Engineering, University of Alabama, 7th Avenue, Tuscaloosa, AL, 35487, USA
  Email : avolkov1@ua.edu
- **Dr. Zhibin Lin**
  Senior Research Scientist, Electro Scientific Industries (ESI), Portland, Oregon, USA
  Email : Linz@esi.com