Dr. Yanbao Ma

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Research Interests: Micro total analysis systems (μTAS) for biological and biomedical applications, including the development of micro fluidic systems for biomedical diagnosis and treatment, cell handling and tissue engineering, and the development of numerical tools for modeling and designing complex microfluidic systems.

Teaching Interests: Fluid Mechanics, Computational Fluid Dynamics, Applied Mathematics, Compressible Viscous Flow, and Micro/Nano fluidics.

Education

- **University of California at Los Angeles,** California.
  Ph.D. in Mechanical Engineering (2003)
- **Chinese Academy of Sciences (CAS),** Beijing, P. R. China
  M.S. in Mechanical Engineering (1997)
- **University of Science and Technology of China**, Hefei, P. R. China
  B.S. in Theoretical and Applied Mechanics (1994)

Professional Experiences

Research

2003-present Postdoctoral Research Associate in Micro Systems Lab, **University of California at Los Angeles**. Conducting experimental and numerical investigation on micro-fluidic systems for bacteria concentration and detection. Extensively experienced with MEMS fabrication.

- Designed and fabricated bio-filters to concentrate bacteria by using dielectrophoretic (DEP) force; simulated electric field and estimated DEP force to optimize design.
- Designed and fabricated bio-filters to concentrate bacteria by using membrane filtration.
- Modeled, designed and fabricated micro-mixer to achieve chaotic mixing in micro channel flow.
- Integrated micro mixers, bio-filters and biosensors to form micro fluidic systems for bioengineering applications.

1997-2003 Graduate student and research assistant at Mechanical and Aerospace Engineering Department, **University of California at Los Angeles**. Focused on stability and receptivity of supersonic boundary layers by using direct numerical simulation and linear stability analysis.

- Studied compressible boundary-layer flows based on spectral methods.
- Simulated supersonic flow over sharp flat plates or wedge by combining shock-capturing methods and high-order shock-fitting methods.
- Investigated characteristics of supersonic boundary-layer normal modes by applying multi-domain spectral methods in linear stability analysis.
- Studied receptivity mechanisms of supersonic boundary layers.
- Studied heat transfer for reacting hypersonic boundary layer flows.
- Simulated reacting hypersonic flow by using shock-fitting methods.
- Investigated real gas affect on stability and receptivity of hypersonic boundary-layer reacting flows.
- Studied magnetohydrodynamic (MHD) affect on supersonic flow.

1994-1997 Graduate student and research assistant at Institute of Mechanics, **Chinese Academy of Sciences.** Focused on turbulent mixing and heat transfer for jet flow under water.

- Simulated turbulent mixing process of air jets under water.
- Studied interaction between shock wave and turbulent mixing.

Teaching

1999-2003 Teaching assistant at Mechanical and Aerospace Engineering Department, **University of California at Los Angeles**. Courses include Aerodynamics, Mathematics of Engineering, Electronic Circuits Lab.

Professional Societies

American Institute of Aeronautics and Astronautics (AIAA) student member.

Publications

Journal publications and books

1. X. Zhong and Y. Ma, Receptivity of Mach 7.99 flow over an axisymmetric blunt cone to freestream acoustic waves. Accepted by *Journal of Fluid Mechanics*.

2. Y. Ma, X. Zhong, Receptivity of a supersonic boundary layer over a flat plate. Part 3: effect of different freestream disturbances. *Journal of Fluid Mechanics*, in press.

3. Y. Ma, X. Zhong, Linear stability and receptivity to frees-stream disturbances of Mach 8 flow over a sharp wedge. Under preparation. To be submitted to *Physics of Fluids, A.*

4. Y. Ma, X. Zhong, Real gas effect on linear stability and receptivity to frees-stream disturbances of hypersonic reacting flow over a flat plate. Under preparation. To be submitted to *Journal of Fluid Mechanics.*

5. Y. Ma, X. Zhong, Receptivity of a supersonic boundary layer over a flat plate. Part 1: wave structures and interactions. *Journal of Fluid Mechanics, Vol 488, 2003*, pp31-78.

6. Y. Ma, X. Zhong, Receptivity of a supersonic boundary layer over a flat plate. Part 2: receptivity to freestream sound. *Journal of Fluid Mechanics, Vol 488, 2003*, pp79-121.

7. X. Zhong, C. W. Whang, and Y. Ma, Numerical simulation of hypersonic boundary layer stability and Receptivity. *Frontiers of Computational Fluid Dynamics, edited by D.A. Caughey and M.M. Hafez, World Scientific, New Jersey, pp. 381-396, 2002.*

8. L. Qi, X. Jiang, Y. Ma, B. Wang, Pressure uniformization of the underexpanded high speed jets. *Mechanics with Practices (in Chinese), Vol 22, No. 3, 2000, pp.52-54.*

9. L. Qi, Y. Ma, X. Jiang, B. Wang, Numerical simulation of the near field of underexpanded high speed jets under water. *Natural Science (in Chinese),* 2000（2）

Conference publications

1. C. Folk, P. Wong, W. Tan, N. Li, Y. Ma, CM Ho, Micro/Nano fluidics for biosignature detection. *XVII National and VI ISHMT/ASME Heat and Mass Transfer Conference, IGCAR, Kalpakkam*, Jan. 5-7, 2004 *Paper No HMT-2004-P1*, pp. 1-5.

2. Y. Ma, X. Zhong, Linear stability and receptivity to frees-stream disturbances of a Mach 10 nonequilibrium reacting oxygen flow over a flat plate. *AIAA paper 2004-0256.*

3. Y. Ma, X. Zhong, Receptivity to frees-stream disturbances of Mach 8 flow over a sharp wedge. *AIAA paper 2003-0788.*

4. X. Zhong, Y. Ma, Numerical simulation of leading edge receptivity of Stetson's Mach 8 blunt cone stability experiments. *AIAA paper 2003-1133.*

5. X. Zhong, Y. Ma, Linear stability and receptivity of Stetson's Mach 8 blunt cone stability experiment. *AIAA paper 2002-2849.*

6. Y. Ma, X. Zhong, Receptivity to free-stream disturbances of Mach 4.5 flow over a flat plate. *AIAA paper 2002-0140.*

7. Y. Ma, X. Zhong, Numerical simulation of receptivity and stability of nonequilibrium reacting hypersonic boundary layers. *AIAA paper 2001-0892.*

8. Y. Ma, X. Zhong, Boundary-layer receptivity to free-stream disturbances for A Mach 4.5 flow over a flat plate. APS meeting, 2001, San Diego.

9. Y. Ma, X. Zhong, Direct numerical simulation of instability of nonequilibrium reacting hypersonic boundary layers. *AIAA paper 2000-0539*.

10. Y. Ma, X. Zhong, Numerical simulation of transient hypersonic flow with Real gas effects. *AIAA paper 99-0416, 1999.*

References

- **Chih-Ming Ho, the Ben Rich-Lockheed Martin Chair Professor**
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