Curriculum Vitae

Wen Shen

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Personal information:

- Born on January 27, 1968 in Shanghai, P. R. China.
- Married with Alberto Bressan, two daughters Luisa Mei Bressan (1998) and Maria Lan Bressan (2001).
- Languages: Chinese(native), English, Norwegian and Italian
- Nationality: Italian(present), Chinese(previous).

Research interests:

Partial Differential equations(PDE), Hyperbolic conservation laws, relaxation problems, numerical approximation for PDEs, discontinuous Ordinary Differential Equations, control theory, differential games etc.

Education and professional positions: (from past to present)

- 08.1986–06.1990: Shanghai Jiao Tong University, China. Majored in Electrical Engineering. Degree: Bachelor of Science.
- 07.1990–12.1990: Shanghai Xing Dong High-Tech. Co., Shanghai, China. Researcher.
- 01.1991–12.1991: University of Oslo, Norway. Intensive Norwegian courses.
- 01.1992–06.1993: Department of Informatics, University of Oslo, Norway. Majored in Informatics. Degree: Cand. mag. (Bachelor of Science).
- 08.1993–06.1994: Department of Informatics, University of Oslo, Norway. Majored in Informatics. Degree: Cand. Scient. (Master of Science).
- 01.1993–08.1994: Teaching assistant at Department of Informatics, University of Oslo, Norway.

- 09.1994–09.1998: Research fellow in Applied Mathematics(numerical analysis), Informatics. Department of Informatics, University of Oslo, Norway. Degree: Cand. Scient. (Ph.D).
- 12.1996–03.1997 and 12.1997–05.1998: Visiting Scientist, S.I.S.S.A., Sector for Functional Analysis, Italy.
- 09.1998–07.2000: maternal leave.
- 08.2000–05.2001: Associate Professor, Department of Mathematics, NTNU (Norwegian University of Science and Technology), Trondheim, Norway.
- 06.2001–10.2002: maternal leave.
- 11.2002–11.2003: Research Associate, sector of functional analysis, SISSA, Trieste, Italy.
- 11.2003–present: Assistant Prefessor of Mathematics, Department of Mathematics, Penn State University, University Park, PA 16802, U.S.A..

Publications:

Recent Preprints (2006):

1. W. Shen, On the Shape of the Avalanche. Preprint 2006. Submitted to Journal of Mathematical Analysis and Applications.
2. W. Shen and Z.F. Xu, Vanishing Viscosity Approximation to Hyperbolic Conservation Laws Preprint, 2006. Submitted to Journal of Differential Equations.
3. Wen Shen, Finite Dimensional Representation of Hyperbolic Conservation Laws with Viscosity, Preprint 2006. Submitted to HYP2006 proceeding.
4. Wen Shen, Non-cooperative and Semi-cooperative Differential Games, Preprint 2006. Submitted to Annal of ISDG(International Symposium of Dynamical Games).

Research papers in international journals with peer reviews(from present to past):

1. A. Bressan and W. Shen, Optimality Conditions for Solutions to Hyperbolic Balance Laws Preprint 2006. To appear in "Control Methods in PDE and Dynamical Systems", F. Ancona and R. Triggiani eds., AMS Contemporary Mathematics Series.
2. A. Bressan and W. Shen, Unique Solutions of Discontinuous O.D.E.'s in Banach Spaces, *Analysis and Applications*, Vol. **4**, No. 3 (2006), pp. 247-262.

3. W. Shen and M. Park, Optimal Tracing of Viscous Shocks in Solutions of Viscous Conservation Laws, Preprint 2005. To appear in SIAM J. Math. Anal. 2006.

4. A. Bressan and W. Shen, Semi-cooperative Strategies for Differential Games, *International Journal of Game Theory*, **32** (2004), pp. 561–593.

5. A. Bressan and W. Shen, Small BV Solutions of Hyperbolic Non-cooperative Differential Games, *SIAM J. Control and Optimization*, **43** (2004), pp. 104–215.

6. A. M. Bruaset, X. Cai, H. P. Langtangen, G. T. Lines, K. Samuelsson, W. Shen, A. Tveito, G. Zumbusch, Performance modeling of PDE solvers, In H. P. Langtangen and A. Tveito, editors, *Advanced Topics in Computational Partial Differential Equations – Numerical Methods and Diffpack Programming.* pp. 361–399, Springer, 2003.

7. A. Bressan and W. Shen, BV estimates for multicomponent chromatography with relaxation, *Discrete and Continuous Dynamical Systems*, The Millennium Issue, **6** (2000), pp.21-38.

8. A. Bressan, W. Shen, On Discontinuous Differential Equations, *Differential Inclusions and Optimal Control*, Lecture Notes in Nonlinear Analysis, **2** (1998), pp. 73–87.

9. W. Shen, A. Tveito and R. Winther, On the zero relaxation limit for a system modeling the motions of a viscoelastic solid, *SIAM J. Math. Anal.*, **30** (1999), pp. 1115–1135.

10. A. Bressan, W. Shen, Uniqueness for discontinuous ODEs and conservation laws, *Nonlinear Analysis, Theory, Methods, and Applications*, **34** (1998), pp. 637–652.

11. W. Shen, Error bounds of finite difference schemes for two-dimensional scalar conservation with source terms, *IMA Journal of Numerical Analysis*, **19** (1999), pp. 77–89.

12. W. Shen, A. Tveito and R. Winther, A system of conservation laws including a stiff relaxation term; the 2D case, *BIT*, **36:4** (1996), pp. 786–813.

Papers for proceedings:

1. A. Bressan and W. Shen, Non-cooperative Differential Games, in "*Hyperbolic Problems: Theory, Numerics and Applications*", pp. 77-84. F. Asakura ed., Yokohama Publishers, 2006.

2. A. Bressan and W. Shen, The convergence of Multicomponent chromatography with relaxation, in *Proceeding of HYP2000 in Magdeburg* (2001), Birkhäuse Verlag Basel, pp.197-205.

3. W. Shen, A. Tveito and R. Winther, Rate of convergence for the zero relaxation limit, in *"Hyperbolic Problems: Theory, Numerics, Applications", the proceedings of the 7th Int. Conf. on Hyperbolic Problems.* Editors: M. Fey and R. Jeltsch, International Series of Numerical Mathematics, Vol. 130, pp. 865-874, Birhäuser Verlag Basel, Switzerland, 1999.

Thesis:

1. W. Shen, *Hyperbolic Conservation Laws with Relaxation Terms,* PhD. Thesis, Department of Informatics, University of Oslo, Norway. March 30, 1998. Advisors: Professor Aslak Tveito and Professor Ragnar Winther.

2. W. Shen, *Numerical Solution of the Pressure Equation in a Simple Model of Aluminium DC-casting,* Thesis for Cand. Scient. Degree(Master of Science) in Informatics, Department of Informatics, University of Oslo, Norway, and Section for Applied Mathematics, SINTEF, Oslo, Norway. April 1994. Advisor: Professor Aslak Tveito.

Research reports:

1. A.M. Bruaset, X. Cai, H.P. Langtangen, G.T. Lines, K. Samuelsson, W. Shen, A. Tveito and G. Zumbusch, CPU-measurements of some numerical PDE simulations, Technical report, Preprint no. 1998-3, Department of Informatics, University of Oslo, Norway.

2. W. Shen, A comparison between two finite element methods for the solution of a simplified model of alloy casting, Research Report, ISBN 82-7368-121-1, ISSN 0806-3036, December 1995, Department of Informatics, University of Oslo, Norway.

3. W. Shen and A. M. Bruaset, Mixed Finite Element Solution of Elliptic Boundary Value Problems, SINTEF-report no. STF33 A94018, Section for Applied Mathematics, SINTEF, Oslo, Norway, 1994.

4. H.P. Langtangen, G. Pedersen and W. Shen, *Finite Element Preprocessors in Diffpack,* SINTEF-report no. STF33 A94051, Section for Applied Mathematics, SINTEF, Oslo, Norway, 1994.

5. H. Thevik, A. Mo, W. Shen, To-dimensjonale strøminingseffekter ved utsvetting under DC-støping, (in Norwegian), SINTEF-report no. STF24 F94064, Section for Applied Mathematics, SINTEF, Oslo, Norway, 1994.

Postscript or pdf files of most of the publications can be found from URL:

`http://www.math.psu.edu/shen_w/Papers.html`

Grants:

- SCREMS Grant from NSF(National Science Fundation), 2006. I am a co-PI(Primary Investigator).

Talks delivered at major mathematical meetings:

- September 22-24, 2006, *Finite Dimensional Representation of Hyperbolic Conservation laws with viscosity.* invited speaker, Midwest PDE Seminar, University of Iowa, Iowa City, Iowa.
- July 3-6, 2006, *Non-cooperative and semi-cooperative differential games*, invited lecture, ISDG Symposium, session on non-zero games. Inria, Sophia Antipolis, French Riviera, France.
- July 17-21, 2006, *Optimal Tracing of Viscous Shocks in Solutions of Conservation Laws*, Eleventh International Conference on Hyperbolic Problems (Theory, Numerics, Applications), Ecole Normale Superieure de Lyon, Lyon, France.
- September 2004, *Non-cooperative differential games*, invited lecture, "Hyperbolic Problems: Theory, Numerics, Applications", the 10th Int. Conf. on Hyperbolic Problems, Osaka, Japan. (presented by A. Bressan.)
- October 2000, *BV estimate and convergence for multi-component chromatography with relaxation*, Oberwolfach, Germany.
- March 2000, *The convergence of Multicomponent chromatography with relaxation*, "Hyperbolic Problems: Theory, Numerics, Applications", the 8th Int. Conf. on Hyperbolic Problems, Magdeburg, Germany.
- February 1998, *Rate of convergence for the zero relaxation limit*, invited lecture, "Hyperbolic Problems: Theory, Numerics, Applications", the 7th Int. Conf. on Hyperbolic Problems, Zurich, Switzerland. (presented by R. Winther)
- June 1996, *Error bounds of finite difference schemes for two-dimensional scalar conservation with source terms* "Hyperbolic Problems: Theory, Numerics, Applications", the 6th Int. Conf. on Hyperbolic Problems, Hong Kong.

Some other selected recent invited lectures:

- April 2003, Penn State Univ., USA, CAM Colloquium. *"Hyperbolic Conservation Laws with relaxation"*.
- June 2003, SISSA/ISAS, Trieste, Italy. *"Non-cooperative differential games"*.
- Aug 2003, Department of Mathematics, University in Oslo, Oslo, Norway. "*Topics on Differential Games*".
- Aug 2003, Dept of Math, NTNU, Trondheim, Norway. *"Small BV solutions of hyperbolic non-cooperative differential games"*.
- Nov 2004, AMS meeting, Pittburg, Pennsylvania. *"Semi cooperative differential games."*
- March 2005, Goergia Tech, USA. *"Non-cooperative and semi-cooperative differential games"*.
- Oct 2005, PDE seminar, Penn State Univ., USA. *"Optimal tracing of viscous shocks in conservation laws."*

Teaching:

- Fall semester 2000, SIF 4050, "Mathematics 4", 4 credits, Insitutt for Mathematics, NTNU (Norwegian University of Science and Technology), Trondheim, Norway.
- Spring semester 2001, SIF 5040, "Numerical Computation", 3 credits, Insitutt for Mathematics, NTNU (Norwegian University of Science and Technology), Trondheim, Norway.
- Spring 2004, MATH/CSE 451, "Numerical Computation", section 1 and 2, 3 credits each. Department of Mathematics, Penn State University, USA.
- Fall 2004, MATH 250, "Ordinary Differential Equations", section 5 and 6, 3 credits each. Department of Mathematics, Penn State University, USA.
- Spring 2005, MATH/SCE 451, "Numerical Computation", section 2, 3 credits. Department of Mathematics, Penn State University, USA.
- Spring 2006, MATH 140, Calculus I, section 2 and 4, 4credits each. Department of Mathematics, Penn State University, USA.

- Fall 2006, MATH 231, Calculus of Several Variables, section 4 and 6, 2 credits each. Department of Mathematics, Penn State University, USA.

Service to the Department.

- Member of the Faculty of Graduate School.
- GTA (Graduate Teaching Assistants) Oversight Committee, from 2004 to 2007.
- Course coordinator for MATH 250, fall 2004.
- Member of the PhD Thesis Defense Committee for Maria Emelainenko, 2005.
- Meeting organizor for WIM (Women In Mathematics) in the department, 2005 and 2006.
- Committee member for qualifying exam in Partial Differential Equations, August 2004.
- Committee member for qualifying exams in numerical analysis, May 2006.
- Committee member for qualifying exams in numerical analysis, August 2006.
- Course coordinator for MATH231, fall 2006.
- One of the local organizer for FE Circus, Penn State, November 3-4, 2006.