

Curriculum Vitae

Dr. Wenjing Zhang

Assistant Professor

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Education

- August 2014, Ph.D. in Applied Mathematics, Department of Applied Mathematics, University of Western Ontario, Canada (2010-2014). Thesis title: *Understanding Recurrent Disease: A Dynamical Systems Approach*, <http://ir.lib.uwo.ca/etd/2265/>. Supervisors: Dr. Pei Yu and Dr. Lindi Wahl
- July 2008, Master of Science in Pure Mathematics. School of Mathematical Sciences, Dalian University of Technology, China (2006-2008). Thesis title: *Explicit Expression for an Upper Bound on the H_2 Norm and Parameterization of Control Gains in Structural Systems*. Supervisor: Dr. Yufeng Lu.
- July 2006, Bachelor of Science, Information and Computational Science, School of Mathematical Sciences, Shandong Normal University, China (2002-2006).

Research Experience

- Sept. 2017 - Present, Assistant Professor and Sept. 2016 - Aug. 2017, Postdoctoral Fellow, Dept. of Mathematics and Statistics, Texas Tech University, USA.
- Sept. 2015- Feb. 2016, Postdoctoral Fellow, Dept. of Applied Mathematics, Western University, Canada.
- Sept. 2014- Aug. 2016, Postdoctoral Fellow, Dept. of Mathematics and Statistics, York University, Canada.

Teaching Experience

- Dynamical Systems: stability theory (MATH 5330), bifurcation theory (MATH 5312) and singular perturbation theory (MATH 5313);
- Mathematical Biology: deterministic models (MATH 5354) and stochastic process (MATH 5355);
- Linear Algebra (MATH 2360), Calculus I (MATH 1451), and Calculus II (at York University, Canada).

Publications

1. Wenjing Zhang, "Deterministic and stochastic in-host tuberculosis models for bacterium-directed and host-directed therapy combination", (*under review*).
2. Wenjing Zhang, "Disease clearance of tuberculosis infection: An in-host continuous-time Markov chain model" (*Applied Mathematics and Computation*, 413 (2022) 126614)
3. Wenjing Zhang, Leif Ellingson, Federico Frascoli, and Jane M Heffernan. "An Investigation of Tuberculosis Progression Revealing the Role of Macrophages Apoptosis via Sensitivity and Bifurcation Analyse". (*Journal of Mathematical Biology*, (2021) 83:31)
4. Wenjing Zhang and Pei Yu. "Revealing the Role of the Effector-regulatory T Cell Loop on Autoimmune Disease Symptoms via Nonlinear Analysis." (*Communications in Nonlinear Science and Numerical Simulation*, No. 93 (2021): 105529.)
5. Wenjing Zhang, Federico Frascoli, and Jane M Heffernan. "Analysis of solutions and disease progressions for a within-host Tuberculosis model". (*Mathematics in Applied Sciences and Engineering 1.1* (2020): 39-49.)

6. Wenjing Zhang. "Analysis of an In-host Tuberculosis Model for Disease Control". (*Applied Mathematics Letters*, no. 99 (2020):105983.)
7. Wenjing Zhang. "Modeling and Analysis of the Multi-annual Cholera Outbreaks With Host-pathogen Encounters". (*International Journal of Bifurcation and Chaos* 30, no. 08 (2020): 2050120.)
8. Jiao Jiang, Wenjing Zhang, Pei Yu, "Tristable phenomenon in a predator-prey system arising from multiple limit cycles bifurcation". *International Journal of Bifurcation and Chaos* 30, no. 09 (2020): 2050129.
9. Wenjing Zhang, Ramnath Bhagavath, Neal Madras, and Jane M Heffernan "Examining HIV Progression Mechanisms via Mathematical Approaches" (*Mathematics in Applied Sciences and Engineering* 99, no. 99 (2020): 1-24.)
10. Pei Yu, and Wenjing Zhang "Complex dynamics in a unified SIR and HIV disease model: A bifurcation theory approach". (*Journal of Nonlinear Science* (2019): 1-54.)
11. Pei Yu, Maoan Han, and Wenjing Zhang. "Multiple recurrent outbreak cycles in an autonomous epidemiological model due to multiple limit cycle bifurcation." (*Journal of Applied Analysis and Computation* 10, no. 5 (2020): 2278-2298.)
12. Sophia R.-J. Jang, Wenjing Zhang, and Victoria Larriva, "Cooperative hunting in a predator-prey system with Allee effects in the prey". *Natural Resource Modeling*. (2018) e12194 <https://rdcu.be/bajoB>
13. Sara M. Clifton, Courtney L. Davis, Samantha Erwin, Gabriela Hamerlinck, Amy Veprauskas, Yangyang Wang, Wenjing Zhang, Armanda Bastos, Holly Gaff. "Modeling the argasid tick (*Ornithodoros moubata*) life cycle." In: Radunskaya A., Segal R., Shtylla B. (eds) Understanding Complex Biological Systems with Mathematics. Association for Women in Mathematics Series, vol 14. Springer, Cham (2018)
14. Wenjing Zhang, Sophia Jang, Jonsson, Colleen, and Linda J. S. Allen. "Models of Cytokine Dynamics in the Inflammatory Response of Viral Zoonotic Infectious Diseases" *Mathematical Medicine and Biology* (2018). doi: 10.1093/imammb/dqy009.
15. Wenjing Zhang and Pei Yu. "Hopf and Generalized Hopf Bifurcations in a Recurrent Autoimmune Disease Model." *International Journal of Bifurcation and Chaos* (2016), 26(5):1650079.
16. Wenjing Zhang, Pei Yu and Lindi M. Wahl. "Backward Bifurcations, Turning Points and Rich Dynamics in Simple Disease Models." *Journal of Mathematical Biology* (2016), 73(4):947-976.
17. Pei Yu, Wenjing Zhang and Lindi M. Wahl. "Dynamical Analysis Simulation of a 2-Dimensional Disease Model with Convex Incidence." *Communications in Nonlinear Science and Numerical Simulation* (2016), 37:163-192.
18. Wenjing Zhang, Lindi M. Wahl and Pei Yu. "Modeling and Analysis of Recurrent Autoimmune Disease." *SIAM Journal on Applied Mathematics* (2014), 74(6):1998-2025.
19. Wenjing Zhang, Lindi M. Wahl and Pei Yu. "Viral Blips May Not Need a Trigger: How Transient Viremia Can Arise in Deterministic In-Host Models." *SIAM Review* (2014), 56(1):127-155.
20. Wenjing Zhang, Lindi M. Wahl and Pei Yu. "Conditions for Transient Viremia in Deterministic In-Host Models: Viral Blips Need No Exogenous Trigger." *SIAM Journal on Applied Mathematics* (2013), 73(2):853-881.

Conference Presentations

1. "Examining HIV Progression Mechanisms via Mathematical Approaches" at Siam LS Minisymposium: Mathematics of Infectious Diseases and our Planet: Talks Honoring the efforts by Levin, Gross and Hallam in organizing the ecology workshops in the 80's and 90's, Siam Virtual Meeting, June 30th, 2020.

2. "Examining HIV Progression Mechanisms via Mathematical Approaches." ICMA VII : Seventh International Conference on Mathematical Modeling and Analysis of Populations in Biological Systems, Arizona State University, Tempe, Arizona, Oct 12-14, 2019
3. "Global Stability and Bifurcation Analysis in a Cholera model with a Poisson Process in Pathogen-host Encounter." The Fifth International Conference on Computational and Mathematical Population Dynamics, Fort Lauderdale, Florida, on May 19-24, 2019
4. "Multiple Limit Cycles in an SIR Model". AWM Research Symposium, Rice University, Houston Texas, on April 5-7, 2019
5. "Multiple attractors in the simple epidemic model." Frontiers of Mathematical Biology: Modeling, Computation and Analysis, University of Central Florida, Orlando, FL during May 2-4, 2018
6. "Dynamical Studies on an Recurrent Disease Model via Model Reduction." American Mathematical Society (AMS), Spring Central Sectional Meeting Ohio State University, Columbus, OH, March 16-18, 2018
7. "Dynamical Analysis on an Autoimmune Disease Model via Model Reduction." ICMA-VI: The 6th International Conference on Mathematical Modeling, October 20-22, 2017, Tucson, Arizona, USA
8. "Application of Mathematical Model of the Inflammatory Response in Pathogen Infections." 2017 Annual Meeting of the Society for Mathematical Biology, July 17-20, 2017, Salt Lake City, Utah, USA
9. "Recurrent Viral Infection May Need No Exogenous Trigger." 2017 Joint Mathematics Meetings, January 4-7, 2017, Atlanta, Georgia, USA
10. "Mechanisms Underlying the Generation of Disease Recurrence." The 5th International Conference on Mathematical Modeling and Analysis of Populations in Biological Systems, October 2-4, 2015, University of Western Ontario, London, Ontario, Canada
11. "Modeling and Analysis of the Relapse-Remission Behavior in Autoimmune Diseases." The 2015 AMMCS-CAIMS Congress, June 7-12, 2015, Waterloo, Ontario, Canada
12. "Compartmental Modeling for the Transmission of Dengue in Guangzhou, China." The 2015 AMMCS-CAIMS Congress, June 7-12, 2015, Waterloo, Ontario, Canada
13. "Recurrent Viral Infection May Need No Exogenous Trigger." Presentation on 2015 Canadian Mathematical Society (CMS) Summer Meeting, June 5-8, 2015, Charlottetown, Canada
14. "A Study of Recurrent Infection in Deterministic In-Host Models." Presentation on the Interdisciplinary Conference Series: Applied Mathematics, Modeling, and Computer Science (AMMCS-2013), August 26-30, 2013, Waterloo, Ontario, Canada
15. "An Analytical Study on Recurrent Viral Infection." Presentation on the Seventh International Conference on Recent Advances in Applied Dynamical Systems, June 8-10, 2013, Linyi University, Linyi, Shandong, China

Invited Lectures

1. "Multiple attractors in an epidemiological model: multiple outbreak cycles may be an intrinsic effect". Nonlinear Analysis and Dynamical Systems at UT Dallas on February 8, 2019
2. "Revealing the Role of the Effector-regulatory T Cell Loop on Autoimmune Disease Symptoms via Nonlinear Dynamics," Department Colloquium, Dalian University of Technology, Dalian, Liaoning Province, People's Republic of China, (December 27, 2018).
3. Dec 21, 2017 "Deterministic and Stochastic Models and Analyses for the Inflammatory Response in Viral Zoonotic Infectious Diseases". Presentation in Mathematics and Science College, Shanghai Normal University, China

4. Dec 19, 2017 “Cytokine Dynamics for the Inflammatory Response in Viral Zoonotic Infectious Diseases”. Presentation in School of Mathematical Sciences, Dalian University of Technology, China
5. Sep 27, 2016 “Rich Dynamics Unfold from Backward Bifurcation.” Presentation in Biomathematics Seminar in the Department of Mathematics and Statistics, Texas Tech University, Lubbock, USA
6. Sep 20, 2016 “Recurrent Diseases May Not Need a Trigger.” Colloquium Talk in the Department of Mathematics and Statistics, Texas Tech University, Lubbock, USA
7. May 29, 2013 “Viral Blips Need No Exogenous Trigger.” Presentation in Mathematics and Science College, Shanghai Normal University, Shanghai, China
8. June 3, 2013 “Modeling Recurrent Viral Infection by a Deterministic ODE System.” Presentation in College of Arts and Sciences, Shanghai Maritime University, Shanghai, China
9. June 6, 2013 “Recurrent Infection May Not Need a Trigger.” Presentation in the Department of Mathematics, Tongji University, Shanghai, China
10. June 14, 2013 “Four Conditions for the Existence of Viral Blips in a Deterministic In-Host Infection Model.” Presentation in School of Mathematical Sciences, Dalian University of Technology, Dalian, Liaoning, China

Workshop and Visiting

1. Mathematical Biosciences Institute Virtual Workshop (MBI) workshop on Mathematical and Computational Methods in Biology from May 5-8, 2020.
2. Mathematical Biosciences Institute Workshop: “Host-Pathogen Dynamics” Monday, February 19th, 2018 to Friday, February 23rd, 2018, at the Ohio State University
3. April 24-28, 2017. Participating the workshop of Women Advancing Mathematical Biology: Understanding Complex Biological Systems with Mathematics at Mathematical Biosciences Institute (MBI).
4. July 23-August 4, 2017. Visiting Dr. Alan Perelson at Los Alamos National Laboratory in New Mexico, USA

Grants and Awards

1. Simons Foundation, “Recurrent dynamics in infectious diseases and immunology”, Award No: A21-0013-001, Project Period: 09/01/2020 - 08/31/2025.
2. Dayawansa Faculty Research Award for the academic year 2020-2021, Department of Mathematics and Statistics, Texas Tech University.
3. AWM Mentoring Grant to visit the Centre for Disease Modelling at York University, Canada, in 2020 summer. (Postponed due to Covid-19 Pandemic)
4. Funded visit to the University of Sydney Mathematical Research Institute (SMRI) through the International Visitor Program in June and July, 2021. (Postponed to June and July, 2022 due to the Covid-19 pandemic).
5. National Science Foundation, “XVIII Red Raider Minisymposium on Modeling in a Heterogeneous World”, Award No: A20-0145-001 Project Period: 03/01/2020 - 02/28/2021.
6. American Institute of Mathematics SQuaRE proposal, titled “Disease dynamics of African Swine Fever”, is granted in 2019.
7. Awarded travel grant provided by American Mathematical Society for attendance at the International Congress of Mathematicians in Rio de Janeiro, Brazil, in August of 2018.
8. Awarded NSF/AWM Travel Grants for Women in the Mathematical Sciences Travel Grant, May 2017.

9. *Conditions for Transient Viremia in Deterministic In-Host Models: Viral Blips Need No Exogenous Trigger*, was awarded a SIGEST paper award from the Society for Industrial and Applied Mathematics (SIAM). The award includes the publication of an invited article in the journal *SIAM Review*, 2014.
10. The 2013 National Award for Outstanding Self-financed Chinese Students Studying Abroad, 2014.
11. Young Researcher Travel Awards, AMMCS-2013, Waterloo, Ontario, Canada, 2013.