Pejman Sanaei

Contact Information

New York University
Courant Institute of Mathematical Sciences
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Research Interests

Mathematical Modeling, Fluid Dynamics, Industrial Mathematics, Filtration, Erosion, Biological Fluid Dynamics.

Education

- **New Jersey Institute of Technology (NJIT),**
  - Ph.D. in Mathematical Sciences (2013-2017, **GPA 4.0**).
    - Dissertation Topic: Mathematical Modeling of Membrane Filtration.
    - Advisor: **Professor Linda J. Cummings.**
  - M.S. in Applied Statistics (2016-2017, **GPA 4.0**).
- **Shiraz University, Iran,**
  - M.S. in Pure Mathematics, September 2009.
    - Dissertation Topic: Geometric and Manifold for Independent Component Analysis.
  - B.S. in Mechanical Engineering, June 2006.
    - Dissertation Topic: Modeling of Tall Buildings in Wind by Fluent.

Academic Positions

- **New York Institute of Technology (NYIT),**
  - Assistant Professor, Department of Mathematics (September 2019-present).
- **Courant Institute of Mathematical Sciences (CIMS), New York University (NYU),**
  - Assistant Professor/Courant Instructor (September 2017-August 2019).
- **Mathematical Institute, University of Oxford,**
  - Visiting Scientist (August 2018).
- **Courant Institute of Mathematical Sciences, New York University,**
  - Adjunct Professor (July-August 2017).

Accepted Articles

- *Membrane Filtration with Multiple Fouling Mechanisms*,
  P. Sanaei, L.J. Cummings,
  Physical Review Fluids (2019).
- *Curvature- and Fluid Stress-Driven Tissue Growth in a Tissue-Engineering Scaffold Pore*,
  P. Sanaei, L.J. Cummings, S.L. Waters, I.M. Griffiths,
  Biomechanics and Modeling in Mechanobiology, 1-17 (2018).
- *Membrane Filtration with Complex Branching Pore Morphology*,
  P. Sanaei, L.J. Cummings,
  Physical Review Fluids (PRF), 3(9), 094305 (2018).
- *Mathematical Modeling of Membrane Filtration*,
  P. Sanaei,
  Ph.D. Thesis (2017).

- *Flow and Fouling in Membrane Filters: Effects of Membrane Morphology*,
  P. Sanaei, L.J. Cummings,
  Journal of Fluid Mechanics (JFM), 818, 744-771 (2017).
- *Flow and Fouling in a Pleated Membrane Filter*,
  P. Sanaei, G.W. Richardson, T. Witelski, L.J. Cummings,
  Journal of Fluid Mechanics, 795, 36-59 (2016).
- *Using Firefly Algorithm to Solve Resource Constrained Project Scheduling Problem*,
  P. Sanaei, V. Zeighami, R. Akbari, S. Shams,
  Proceedings of Seventh International Conference on Bio-Inspired Computing: Theories and Applications (BIC-TA 2012).
- *Bee Algorithm for Solving Resource Constrained Project Scheduling Problem*,
  P. Sanaei, V. Zeighami, R. Akbari, S. Shams,
  8th International Project Management Conference, Tehran, Iran (2012).

Under Review Articles

- *Characterizing the Effects of Pleat Packing Density in Pleated Membrane Filters Performance*,
  D. Fong, **P. Sanaei**,
  Submitted (2019).

Books

- *Solutions to Precalculus Problems*,
  P. Sanaei, I. Habibi, Avande Andishe Publications (2007).

Articles In Prepration

- *Meteorites with Stable Descending Orientation*,
  P. Sanaei, M.J. Shelley, L. Ristroph (Preprint).
- *Diffusion Effects on Filtration Process*,
  Z. Chen, S.Y. Liu, **P. Sanaei** (Preprint).
- *Flow and Fouling in Multi-Layered Membrane Filters*,
  D. Fong, L.J. Cummings, S.J. Chapman, **P. Sanaei**, (Preprint).
- *Stochastic Approach to Model Fouling in Membrane Filters with Complex Pore Morphology*,
  P. Sanaei, B. Gu, L. Kondic, L.J. Cummings (Preprint).
- *Modeling and Design Optimization for Pleated Membrane Filters*,
  Y. Sun, **P. Sanaei**, L. Kondic, L.J. Cummings (Preprint).
- *Effects of Membrane Morphology on Flow and Fouling: Modeling of Connected Membrane Filters*,
  D.L. Renaud, B. Gu, **P. Sanaei**, L. Kondic, L.J. Cummings (Preprint).
- *Effects of Nutrient Depletion on Tissue Growth in a Tissue-Engineering Scaffold Pore*,
  P. Sanaei (Manuscript in preparation).
- *Cell Migration in Microfluidic Mazes*,
  P. Sanaei (Manuscript in preparation).
- *Erosion in Network Channels*,
  P. Sanaei, M.J. Shelley, L. Ristroph (Manuscript in preparation).

Abstracts

- *Effects of Pore Morphology and Nutrient Depletion on Tissue Growth in a Tissue-Engineering Scaffold Pore*,
  P. Sanaei,
  International Congress on Industrial and Applied Mathematics (ICIAM) 2019.
- *Deterministic and Stochastic Models for membrane Filters Fouling*,
  P. Sanaei,
  ICIAM 2019.

- *On Stability of Oriented Meteorites*,
  P. Sanaei, M. Shelley, L. Ristroph,
  SIAM-DS 2019.
- *Stable Flight of Meteors*,
  P. Sanaei, M. Shelley, L. Ristroph,
  Bulletin of the American Physical Society (APS), 2019.
- *Membrane Filtration with Multiple Fouling Mechanisms*,
  P. Sanaei, L.J. Cummings,
  Bulletin of the American Physical Society, 2018.
- *Modeling Connectivity and Asymmetry in Membrane Filters*,
  B. Gu, D.L. Renaud, **P. Sanaei**, L. Kondic, L.J. Cummings,
  Bulletin of the American Physical Society, 2018.
- *Flow and Fouling in Multi-Layered Membrane Filters*,
  D. Fong, **P. Sanaei**, S.J. Chapman, L.J. Cummings,
  Bulletin of the American Physical Society, 2018.
- *Modeling and Design Optimization for Pleated Membrane Filters*,
  Y. Sun, **P. Sanaei**, L. Kondic, L.J. Cummings,
  Bulletin of the American Physical Society, 2018.
- *Mathematical Modeling of Microstructured Membrane Filters: A Stochastic Approach*,
  P. Sanaei, B. Gu, L. Kondic, L.J. Cummings,
  Interpore 2018-10th International Conference on Porous Media & Annual Meeting.
- *The Effect of Scaffold Morphology on Tissue Growth*,
  P. Sanaei, L.J. Cummings, I.M. Griffiths, S.L. Waters,
  Bulletin of the American Physical Society, 2018.
- *Modeling Filtration and Fouling with a Microstructured Membrane Filter*,
  L.J. Cummings, **P. Sanaei**,
  Bulletin of the American Physical Society, 2017.
- *Stochastic Approach to Model Fouling in Membrane Filters with Complex Pore Morphology*,
  P. Sanaei, B. Gu, L. Kondic, L.J. Cummings,
  Bulletin of the American Physical Society, 2017.
- *Curvature and Stress Driven Tissue Growth in a Tissue Engineering Scaold Pore*,
  P. Sanaei, L.J. Cummings, I.M. Griffiths, S.L. Waters,
  The American Physical Society-CAM Conference, 2017.
- *Mathematical Modeling of Optimal Membrane Filtration*,
  P. Sanaei, L. Kondic, L.J. Cummings,
  Interpore 2017-9th International Conference on Porous Media & Annual Meeting.
- *Modeling Flow and Fouling in Membrane Filters: Insights into Filter Design*,
  P. Sanaei, L.J. Cummings,
  SIAM Annual Meeting-Student Days Talks, 2017.
- *Stochastic Approach to Model Fouling in Membrane Filters with Complex Pore Morphology*,
  P. Sanaei, B. Gu, L. Kondic, L.J. Cummings,
  Bulletin of the American Physical Society, 2017.
- *Mathematical Modeling of Pleated Membrane Filters*,
  P. Sanaei, G.W. Richardson, T. Witelski, L.J. Cummings,
  SIAM-CSE 2017.
- *Optimizing Internal Structure of Membrane Filters*,
  L.J. Cummings, **P. Sanaei**,
  Bulletin of the American Physical Society, 2016.

- *Modeling Branching Pore Structures in Membrane Filters*,
  P. Sanaei, L.J. Cummings,
  Bulletin of the American Physical Society, 2016.
- *Optimum Permeability Profile and Fouling in Membrane Filters*,
  P. Sanaei, L.J. Cummings,
  SIAM Annual Meeting, 2016.
- *Flow and Fouling in Membrane Filters: Effects of Membrane Morphology*,
  P. Sanaei, L.J. Cummings,
  Bulletin of the American Physical Society, 2015.
- *Simplified Model for Fouling of a Pleated Membrane Filter*,
  P. Sanaei, L.J. Cummings,
  Bulletin of the American Physical Society, 2014.

Technical Reports

- *Motion of Liquid Droplets/Film in the Gas Channels of SO_2 Module*,
  The Mathematical Problems in the Industry workshop (MPI), Claremont Center for the Mathematical Sciences (CCMS) 2018.
- *On Characterizing and Simulating Porous Media*,
  The Mathematical Problems in the Industry workshop (MPI), NJIT 2017.
- *On characterizing and Simulating Porous Media*,
  The Mathematical Problems in the Industry workshop (MPI), Duke University 2016.
- *Flooding in Porous Media*,
  The Mathematical Problems in the Industry workshop (MPI), University of Delaware 2015.
- *Effects of Membrane Morphology on Separation Efficiency*,
  The Mathematical Problems in the Industry workshop (MPI), NJIT 2014.

Invited Talks

- *Mathematical Models of Recongurable Flow Networks and Bodies*,
  NYIT (March 2019).
- *Stable Flight of Meteoroids*,
  NYU, Courant Institute of Mathematical Sciences (February 2019).
- *Stochastic Approach to Model Fouling in Membrane Filters with Complex Pore Morphology*,
  NJIT, Capston Lab (January 2018).
- *Mathematical Models for Membrane Filtration*,
  NYU, Courant Institute of Mathematical Sciences (November 2017).
- *Mathematical modeling of Tissue Engineering*,
  NYU, Courant Institute of Mathematical Sciences (October 2017).
- *Mathematical Modeling of Membrane Filtration*,
  The City College of New York (Levich Institute) (October 2017).
- *Mathematical Modeling of Membrane Filtration*,
  NYU, Courant Institute of Mathematical Sciences (July 2017).
- *Internal Structure and Morphology Profile in Optimizing Filter Membrane Performance*,
  Frontiers in Applied and Computational Mathematics (FCAM), NJIT (June 2017).
- *Mathematical Modeling of Membrane Filtration*,
  University of Delaware (UD), Mathematical Problems in Industry (MPI) Fellow Talk (June 2015).

Conference Talks

- *Mathematical Modeling of Microstructured Membrane Filters: A Stochastic Approach*,
  The 9th Northeast Complex Fluids and Soft Matter Workshop (NCS8) (University of Pennsilvenia, May 2018).
- *Stochastic Approach to Model Fouling in Membrane Filters with Complex Pore Morphology*,
  Applied Math Days (Rensselaer Polytechnic Institute (RPI), April 2018).
- *Stochastic Approach to Model Fouling in Membrane Filters*,
  The 8th Northeast Complex Fluids and Soft Matter Workshop (NCS8) (Columbia University, January 2018).
- *Mathematical Modeling of Membrane Filtration*,
  Graduate Student Seminar (NJIT, June 2017).
- *The Effect of Scaffold Morphology on Tissue Growth*,
  The 7th Northeast Complex Fluids and Soft Matter Workshop (NCS7) (Princeton University, May 2017).
- *Modeling Complex Internal Geometry of Membrane Filters*,
  Dana Knox Student Research Showcase (NJIT, April 2017).
- *Curvature and Stress Driven Tissue Growth in a Tissue Engineering Scaffold*,
  Applied Math Days (Rensselaer Polytechnic Institute (RPI), April 2017).
- *Modeling Branching Pore Structures in Membrane Filters*,
  The 6th Northeast Complex Fluids and Soft Matter Workshop (NCS6) (Stevens Institute of Technology, January 2017).
- *Flow and fouling in Membrane Filters: Effects of Membrane Morphology*,
  The 69th New England Complex Fluids Workshop (Boston, December 2016).
- *Investigating the Performance of Pleated Membrane Filters*,
  Gene Golub SIAM Summer School, poster presentation (Drexel, August 2016).
- *Investigating the Performance of Pleated Membrane Filters*,
  Frontiers in Applied and Computational Mathematics (FACM), poster presentation (NJIT, June 2016).
- *Models for Membrane Filtration*,
  Graduate Student Seminar (NJIT, May 2016).
- *Optimum Pore Profile and Fouling in Membrane Filters*,
  Dana Knox Student Research Showcase (NJIT, April 2016).
- *Permeability Profile in Optimization Filter Membrane Performance*,
  Applied Math Days (Rensselaer Polytechnic Institute (RPI), April 2016).
- *Optimum Permeability Profile and Fouling in Membrane Filters*,
  The 5th Northeast Complex Fluids and Soft Matter Workshop (NCS5) (New York University Tandon, School of Engineering, January 2016).
- *Flow and Fouling in a Pleated Membrane Filter*,
  Graduate Student Association (GSA) Research Day (NJIT, October 2015).
- *Flow and Fouling in a Pleated Membrane Filter*,
  The 4th Northeast Complex Fluids and Soft Matter Workshop (NCS4) (Stony Brook University, June 2015).
- *Mathematical Modeling of Membrane Filtration*,
  Graduate Student Seminar (NJIT, June 2015).
- *Effect of Filter Membrane Morphology on Separation Efficiency*,
  Frontiers in Applied and Computational Mathematics (FACM), poster presentation (NJIT, May 2015).

- *Flow and Fouling in a Pleated Membrane Filter*,
  Dana Knox Student Research Showcase (NJIT, April 2015).
- *Effect of Filter Membrane Morphology on Separation Efficiency*,
  Applied Math Days (Rensselaer Polytechnic Institute (RPI), April 2015).
- *Effect of Filter Membrane Morphology on Separation Efficiency*,
  NCS3 (NJIT, January 2015).
- *Simplified Model for Fouling of a Pleated Membrane Filter*,
  Graduate Student Seminar (NJIT, July 2014).

Mentoring

- Mentoring undergrad students (Zhengyi Chen, Shi Yue Liu, Zeshun Zong, Xinyu LI, Wonjoon Choi, Diana Riazi, Mikus Kannenieks, Joseph Hall, Shengmin Yang) at CIMS NYU (2017-present).
- Mentoring, with my Ph.D. advisor, two Ph.D. students (Yixuan Sun and Binan Gu) at NJIT (2016-present).

Teaching Experience

- Graduate
  - Advanced Topics in Applied Math: Modeling and Experiment in Fluid Dynamics, NYU, Spring 2019.
- Undergraduate
  - Calculus II, NYIT, Fall 2019 (Evaluation score:).
  - Differential Equations, NYIT, Fall 2019 (Evaluation score:).
  - Partial Differential Equations, NYU, Spring 2019 (Evaluation score: 4.8/5).
  - Partial Differential Equations, NYU, Fall 2018 (Evaluation score: 4.7/5).
  - Numerical Analysis, NYU, Spring 2018 (Evaluation score: 4.7/5).
  - Numerical Analysis, NYU, Fall 2017 (Evaluation score: 4.5/5).
  - Math For Economics II, NYU, Summer 2017 (Evaluation score: 3.9/5).
  - Calculus III, NJIT, Spring 2017 (Evaluation score: 3.6/4).
  - Calculus II, NJIT, Fall 2016 (Evaluation score: 3/4).
  - Linear Algebra, NJIT, Fall 2015 (Evaluation score: 3.1/4).
  - Differential Equations, NJIT, Spring 2015 (Evaluation score: 3.3/4).
  - Calculus I, II, Iran, 2011-2012.
  - Mathematics Olympiad, Iran, 2000-2012.

Synergistic Activities

- Mentor and presenter for Graduate Student Mathematical Modeling Camp (GSMMC), UD (June 2019).
- Reviewer for JFM, SIAM Journal on Applied Mathematics (SIAP), Journal of Membrane Science (JMS), Tissue Engineering Part C-Methods and Desalination Journal.
- Minisymposium Organizer, Industrial and Applied Mathematics (ICIAM), Valencia (July 2019).
- Minisymposium Organizer, SIAM Conference on Application of Dynamical Systems (SIAM-DS), Utah (May 2019).
- Session Chair, APS Annual March Meeting (March 2019).
- Session Chair, APS Division of Fluid Dynamics Annual Meeting (November 2018).

- Organizer for Applied Math Summer Undergraduate Research Experience (AM-SURE), CIMS NYU(Summer 2018).
- Organizer for Applied Math and Applied Math Lab seminars, CIMS NYU (2017-2018).
- Minisymposium Organizer, SIAM Conference on Computational Science and Engineering (SIAM-CSE), Atlanta, Georgia (February–March 2017).
- Member of NJIT GSA Travel Award Committee Panel (2016-2017).
- Vice president of NJIT Ph.D. Student Club (2016-2017).
- President of NJIT SIAM Student Chapter (2016-2017).
- President of Graduate Student Math Club at NJIT (2016-2017).
- Organizer for graduate students summer talks for DMS (2016).
- Captain of NJIT Math Club soccer team (2016).

Honors and Awards

2018	MPI Travel Award.
2017	APS-CAM Conference Travel Award
2017	SIAM Annual Meeting Student Travel Award
2017	SIAM-CSE Student Travel Award
2016	NJIT Ahluwalia Fellowship Award
2016	NJIT GSA Research Day Award
2016	Gene Golub SIAM Summer School Travel Award
2016	MPI Travel Award.
2016	NJIT GSA Conference Travel Award
2016	NJIT Class of '58 Fellowship Award
2015	MPI Travel Award.
2015	NJIT Ahluwalia Fellowship Award
2015	NJIT GSA Research Day Award
2015	NJIT GSA Conference Travel Award
2014	APS-DFD Conference Travel Award
2014	MPI Workshop, Graduate Fellowship (NSF Grant DMS-1261596)
2014	NJIT Provost Doctoral Award.
2013	MPI Travel Award.
2013	NJIT Provost Doctoral Award.
2006	36th rank in National Mathematical Olympiad Contest in Iran.
2001	Top 0.1% rank among 1000000 in National Entrance Exam in Iran.
1997	Selected for National Organization for Development of Exceptional Talents (NODET), Iran.

Workshops & Conference

- *Gene Golub SIAM Summer School* (Drexel University, July–Augest 2016).
- *MPI* (NJIT, UD, Duke University, NJIT and CCMS June 2014, 2015, 2016, 2017, 2018, 2019).
- *FACM* (NJIT, May 2013, 2014, 2015, 2016, 2017).
- *Waves, Spectral Theory, & Applications* (Princeton University, September 2015).
- *Graduate Student Mathematical Modeling Camp (GSMMC)* (RPI, June 2013).

Professional Societies

- American Physical Society (APS).
- Society for Industrial and Applied Mathematics (SIAM).
- American Mathematical Society (AMS).
- American Association for the Advancement of Science (AAAS).

Extracurricular Activities

- Organizer and team member for DMS graduate student association soccer games.
- Member of chess club at Shiraz University.
- Playing piano.

Relevant Skills

- Computer Languages: Matlab, C++, R, R Studio.
- Tools: LaTex, Microsoft Office, Fluent, AutoCAD, Minitab, Mathematica.

References

- **Linda J. Cummings**, Professor of Mathematical Sciences,
  New Jersey Institute of Technology,
  (973)-596-5479, `linda.cummings@njit.edu.`
- **Lou Kondic**, Professor of Mathematical Sciences,
  New Jersey Institute of Technology,
  (973)-596-2996, `lou.kondic@njit.edu.`
- **Ian M. Griffiths**, Research Fellow of Mathematical Institute,
  University of Oxford,
  +44 1865 615139, `Ian.Griffiths@maths.ox.ac.uk.`
- **Thomas P. Witelski**, Professor of Mathematics,
  Duke University,
  (919) 660-2841, `witelski@math.duke.edu.`
- **Esteban G. Tabak**, Professor of Mathematics,
  Courant Institute of Mathematical Sciences, New York University,
  (212) 998-3284, `tabak@cims.nyu.edu.`
- **Michael J. Shelley**, Professor of Mathematics,
  Courant Institute of Mathematical Sciences, New York University,
  (212) 998-3088, `shelley@cims.nyu.edu.`
- **Aleksandar Donev**, Professor of Mathematics,
  Courant Institute of Mathematical Sciences, New York University,
  (212) 992-7315, `donev@courant.nyu.edu.`
- **Vindya Bhat**, Clinical Assistant Professor of Mathematics,
  Courant Institute of Mathematical Sciences, New York University,
  (212) 992-3229, `vbhat@cims.nyu.edu.`