

## Pejman Sanaei

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### CONTACT INFORMATION

New York University  
Courant Institute of Mathematical Sciences [ps160@nyu.edu](mailto:ps160@nyu.edu)  
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New York, New York 10012-1185 USA

### 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 PREPARATION

- *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

- *Modeling Flow and Fouling in Membrane Filters*,  
**P. Sanaei**,  
International Congress on Industrial and Applied Mathematics (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 Scaffold 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<sub>2</sub> 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 Reconfigurable 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).

- *Mathematical Modeling of Microstructured Membrane Filters: A Stochastic Approach*, The 9th Northeast Complex Fluids and Soft Matter Workshop (NCS8) (University of Pennsylvania, 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, Diana Riazi, Mikus Kannenicks, Joseph Hall, Shengmin Yang) at CIMS NYU (2018-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
  - 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

- Reviewer for JFM, SIAM Journal on Applied Mathematics (SIAP), Journal of Membrane Science (JMS) and Tissue Engineering Part C-Methods.
- 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–August 2016).
- *MPI* (NJIT, UD, Duke University, NJIT and CCMS June 2014, 2015, 2016, 2017, 2018).
- *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](mailto:linda.cummings@njit.edu).
- **Lou Kondic**, Professor of Mathematical Sciences,  
New Jersey Institute of Technology,  
(973)-596-2996, [lou.kondic@njit.edu](mailto:lou.kondic@njit.edu).
- **Ian M. Griffiths**, Research Fellow of Mathematical Institute,  
University of Oxford,  
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- **Thomas P. Witelski**, Professor of Mathematics,  
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(919) 660-2841, [witelski@math.duke.edu](mailto:witelski@math.duke.edu).
- **Esteban G. Tabak**, Professor of Mathematics,  
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- **Michael J. Shelley**, Professor of Mathematics,  
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- **Aleksandar Donev**, Professor of Mathematics,  
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- **Vindya Bhat**, Clinical Assistant Professor of Mathematics,  
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(212) 992-3229, [vbhat@cims.nyu.edu](mailto:vbhat@cims.nyu.edu).