

# Anh Phong Tran

POSTDOCTORAL RESEARCH FELLOW

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## Education

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### Northeastern University

Boston, MA

Ph.D. in Chemical Engineering (Advisor: Dr. Eduardo D. Sontag)

Sept. 2014 - Dec. 2020

Thesis: "Decision making by heterogeneous cell populations: immune-tumor interactions under metronomic chemotherapy and distributed computation in synthetic biology"

### Northeastern University

Boston, MA

M.S. in Electrical and Computer Engineering (Concentration in Communications, Control, and Signal Processing)

Class of 2020

### Tufts University

Medford, MA

B.S. in Chemical and Biological Engineering, Magna Cum Laude

Class of 2013

## Work Experience

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### Memorial Sloan Kettering Cancer Center

New York, NY

Postdoctoral Research Fellow, Advisor: Dr. Joseph O. Deasy and Dr. Allen Tannenbaum

Jan. 2021 - Present

- Application of advanced mathematical methods for analysis of cancer datasets

### Northeastern University

Boston, MA

Research Assistant, Advisor: Dr. Eduardo Sontag

Sept. 2018 - Dec. 2020

- Modeled the immune-tumor-drug interactions during metronomic chemotherapy and the emergence of drug resistance
- Development of new chemotherapy drug regimens based on optimal control theory
- Developed algorithms to design logical circuits using distributed computation in synthetic biology

Research Assistant, Advisor: Dr. Qianqian Fang

May. 2016 - Aug. 2018

- Developed a new 3D mesh generation workflow for the human head (Brain2mesh).
- Algorithm improvement for the simulation of light transport inside biological tissues using graphics processing units (MMC/MCX).
- Dosimetry of near-infrared light using transcranial and intranasal shedding for the treatment of major depressive disorders

Teaching Assistant

Jan. 2015 - May. 2016

- CHME 4512: Chemical Engineering Process Control
- CHME 3313: Transport Processes 2 and Separations

### Tufts University

Medford, MA

Researcher in Chemical Process Control, Advisor: Dr. Christos Georgakis

Jan. 2014 - Aug. 2014

- Developed a new approach to create high-dimensional steady-state surrogate/approximate models of industrial plant-wide processes.
- Applied D-optimal designs to reduce considerably calculation costs and net-elastic regularization techniques to avoid overfitting issues.
- Demonstrated the applicability of surrogate models to study difficult operability problems such as the snow-ball effects in processes with recycle streams, operating cost optimization in high-dimensional spaces, plant-wide heat integration, and control of the product quality.

Researcher in Transport Phenomena, Advisor: Dr. Jerry H. Meldon

Jan. 2014 - Aug. 2014

- Solved transient permeation and heat conduction problems in layered composite materials with external transfer resistance.
- Applied Separation of Variables and Laplace transform techniques to solve partial differential equations.
- Proved the ability to accurately calculate mass permeation by combining the lead terms of "short-time" and "long-time" solutions.

## Skills

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### Research Interests

light optics, high-performance computing, Monte Carlo methods, control theory, systems biology, cancer modeling, machine learning, computational geometry, medical imaging, neuroscience, heat and mass transfer, reaction kinetics, synthetic biology

### Programming Languages

C++, MATLAB, Python, LaTeX, OpenMP, OpenCL, OpenACC & CUDA

### Languages

French (Native), Vietnamese (Bilingual Proficiency) & Dutch (Limited Working Proficiency)

## Awards

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2014 **Northeastern University**, Distinguished Dean's Fellowship  
2011 **Bunker Hill Community College**, Academic Excellence Award

Boston, MA  
Charlestown, MA

## Peer-Reviewed Publications

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Total Citations: **51**, h-index: **4**, i10-index: **3** (Last updated: Dec. 2020). \* indicates equal contributions.

**“Optimization of heuristic logic synthesis by iteratively reducing circuit substructures using a database of optimal implementations”.**  
Tran, A.P., Al-Radhawi, M.A., Ernst, E.A., and Sontag, E.D. In submission to **IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems**.

**“Transient diffusion into a bi-layer membrane with transfer resistance: Exact solution and time lag analysis”.**  
Tran, A.P., Meldon, J. H., and Sontag, E.D., 2020. **Frontiers in Chemical Engineering**.

**“Distributed implementation of Boolean functions by transcriptional synthetic circuits”.**  
Tran, A.P.\*, Al-Radhawi, M.A.\*, Ernst, E.A., Chen, T., Voigt, C.A., and Sontag, E.D., 2020. **ACS Synthetic Biology**, 9(8), p. 2172-2187.

**“Delicate balances in cancer chemotherapy: modeling immune recruitment and emergence of systemic drug resistance”.**  
Tran, A.P.\*, Al-Radhawi, M.A.\*, Kareva, I., Wu, J., Waxman, D.J. and Sontag, E.D., 2020. **Frontiers in Immunology**, 11, p. 1376.

**“Modeling voxel-based Monte Carlo light transport with curved and oblique boundary surfaces”.**  
Tran, A.P. and Jacques, S.L., 2020. **Journal of Biomedical Optics**, 25(2), p.025001.

**“Improving model-based functional near-infrared spectroscopy analysis using mesh-based anatomical and light transport models”.**  
Tran, A.P., Yan, S. and Fang, Q., 2020. **Neurophotonics**, 7(1), p.015008.

**“Selective photobiomodulation for emotion regulation: model-based dosimetry study”.**  
Tran, A.P.\*, Cassano, P.\*, Katnani, H., Bleier, B.S., Hamblin, M.R., Yuan, Y. and Fang, Q., 2019. **Neurophotonics**, 6(1), p.015004.

**“Dual-grid mesh-based Monte Carlo algorithm for efficient photon transport simulations in complex three-dimensional media”.**  
Yan, S., Tran, A.P. and Fang, Q., 2019. **Journal of Biomedical Optics**, 24(2), p.020503.

**“On the estimation of high-dimensional surrogate models of steady-state of plant-wide processes characteristics”.**  
Tran, A.P. and Georgakis, C., 2018. **Computers & Chemical Engineering**, 116, pp.56-68.

## Conference Presentations, Papers & Non Peer-Reviewed Publications

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Tian, F., Varghese, J., Tran, A.P., Fang, Q. and Gonzales-Lima, F. **“Effects of wavelength on transcranial laser stimulation: a Monte Carlo simulation study based on standard brain model”.** In *Modeling PBM Dosimetry (11221-10)*. *International Society for Optics and Photonics (Feb 2020)*.

Tran, A.P., Al-Radhawi, M.A., Kareva, I, and Sontag E.D. **“Finding the optimal metronomic chemotherapy regimen: a delicate balance between immune recruitment, cancer resistance, and drug cytotoxicity”.**  
*AMS Special Session on Utilizing Mathematical Models to Understand Tumor Heterogeneity and Drug Resistance, 1154-92-2447 (Jan 2020)*.

Vanegas, M., Tran, A.P., Laistler, E. and Fang, Q. **“Mobile phone camera-based SpO2 measurements using broadband light and colored paper filters”.** In *Optics and Biophotonics in Low-Resource Settings V (10869-14)*. *International Society for Optics and Photonics (March 2019)*.

Tran, A.P. and Fang, Q. **“Generating High Quality Tetrahedral Meshes of the Human Head and Applications in fNIRS.”**  
In *Optical Tomography and Spectroscopy* (pp. JTU3A-52). *Optical Society of America (April 2018)*.

Yan, S., Tran, A.P. and Fang, Q. **“A dual-mesh Monte Carlo algorithm using a coarse tetrahedral mesh and voxel output.”** In *Optical Tomography and Spectroscopy* (pp. JTh3A-17). *Optical Society of America (April 2018)*.

Tran, A.P. and Fang, Q. **“Generation of high-quality tetrahedral head mesh models from MRI scans.”** *43rd Northeast Bioengineering Conference, 224 (April 2017)*.

Sahin, S., Sun, X., Vanegas, M., Tran, A.P. and Fang, Q. **“Developing an Anatomically Accurate Multi-layered Optical Brain Phantom for fNIRS Studies.”** In *Optical Tomography and Spectroscopy* (pp. JW3A-70). *Optical Society of America (April 2018)*.

Tran, A.P. and Podlaha-Murphy, E.J. **“Electrodeposition of Ni-Fe-Mo-W Alloys.”**  
*11th-12th Quarterly Report July-December 2015 AESF Research Project# R-117*.

Meldon, J.H. and Tran, A.P. **“Analysis of transient permeation and conduction in composites with external mass transport resistance”.** *AIChE Annual Meeting*, pp. 410g. (Nov 2015).

Meldon, J.H. and Tran, A.P. **“Facile Analysis of Transient Diffusion and Heat Conduction”.** *AIChE Annual Meeting*, pp. 418v. (Nov 2014).