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Research Interests

Molecular simulation methods, Multiscale simulation, Computational Kinetic Theory, Monte Carlo methods.

Microscale/Nanoscale Fluid Mechanics and Heat Transfer, Kinetic Theory of gases and phonons for applications to small-scale transport

Educational Background

Ph.D. in Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, MA, 1998

SM in Physics, Massachusetts Institute of Technology, 1998

MA in Engineering Cambridge University, U.K, 1997

SM in Mechanical Engineering, Massachusetts Institute of Technology, 1995

BA in Engineering, Cambridge University, U.K., 1993

Selected Publications

1. Hadjiconstantinou, N.G, Patera, A.T. Heterogeneous Atomistic-Continuum Representations for Dense-Fluid Systems. *International Journal of Modern Physics C*, **8**, 967-976, 1997.[pdf reprint](#)
2. Hadjiconstantinou, N.G. Hybrid Atomistic-continuum Formulations and the Moving Contact-line Problem. *Journal of Computational Physics*, **154**, 245-265, 1999.[pdf reprint](#)
3. Hadjiconstantinou, N.G., Analysis of Discretization in the Direct Simulation Monte Carlo. *Physics of Fluids*, **12**, 2634-2638, 2000.[pdf reprint](#)
4. Hadjiconstantinou, N.G., Sound Wave Propagation in Transition-regime Micro



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- and Nano Channels. *Physics of Fluids*, **14**, 802-809, 2002.[pdf reprint](#)
5. Hadjiconstantinou, N.G., Simek, O. Constant-wall-temperature Nusselt Number in Micro and Nano Channels. *Journal of Heat Transfer*, **124**, 356-364, 2002.[pdf reprint](#)
6. Hadjiconstantinou, N.G., Simek, O. Sound propagation at small scales under continuum and non-continuum transport. *Journal of Fluid Mechanics*, **488**, 399-408, 2003.[pdf reprint](#)
7. Hadjiconstantinou, N.G., Comment on Cercignani's Second-Order Slip Coefficient. *Physics of Fluids*, **15**, 2352-2354, 2003.[pdf reprint](#)
8. He, G., Hadjiconstantinou, N.G. A Molecular View of Tanner's Law: Molecular Dynamics Simulations of Droplet Spreading. *Journal of Fluid Mechanics*, **497**, 123-132, 2003.
9. Hadjiconstantinou, N.G., Garcia, A.L., Bazant, M.Z., He, G. Statistical Error in Particle Simulations of Hydrodynamic Phenomena. *Journal of Computational Physics*, **187**, 274-297, 2003.[pdf reprint](#)
10. Wijesinghe, H.S., Hadjiconstantinou, N.G. Discussion of hybrid atomistic continuum methods for multiscale hydrodynamics. Special Issue on Multiscale Methods for Emerging Technologies in the *International Journal of Multiscale Computational Engineering*, **3**, 189-202, 2004.
11. Kadau, K., Germann, T.C., Hadjiconstantinou, N.G., Lomdahl, P.S., Dimonte, G., Holian, B.L., Alder, B.J. Nanohydrodynamics Simulations: An Atomistic View of the Rayleigh-Taylor Instability, *Proceedings of the National Academy of Sciences*, **101**, 5851-5855, 2004. Recommended to the *Journal Club of Condensed Matter Physics*.
12. Wijesinghe, H.S., Hornung, R., Garcia, A.L., Hadjiconstantinou, N.G. Three-Dimensional Hybrid Continuum-Atomistic Simulations for Multiscale Hydrodynamics. *Journal of Fluids Engineering*, **126**, 768-777, 2004.[pdf reprint](#)
13. Hadjiconstantinou, N.G., Validation of a Second-Order Slip Model for Dilute Gas Flows. *Microscale Thermophysical Engineering*, **9**, 137-153, 2005.
14. Hadjiconstantinou, N.G., Al-Mohssen, H.A. A Linearized Kinetic Formulation Including a Second-Order Slip Model for an Impulsive Start Problem at Arbitrary Knudsen Numbers. *Journal of Fluid Mechanics*, **533**, 47-56, 2005.[pdf reprint](#)
15. Baker, L.L., Hadjiconstantinou, N.G. Variance Reduction for Monte Carlo Solutions of the Boltzmann Equation. *Physics of Fluids*, **17**, 051703, 1-4, 2005.[pdf reprint](#)
16. Hadjiconstantinou, N.G., Oscillatory Shear-Driven Gas Flows in the Transition and Free-Molecular-Flow Regimes. *Physics of Fluids*, **17**, 100611, 1-9, 2005.[pdf reprint](#)
17. Hadjiconstantinou, N.G., The Limits of Navier-Stokes Theory and Kinetic Extensions for Describing Small Scale Gaseous Hydrodynamics. *Physics of Fluids*, **18**, 111301, 2006. [pdf reprint](#)
18. Homolle, T.M.M., Hadjiconstantinou, N.G., Low-variance Deviational Simulation Monte Carlo. *Physics of Fluids*, **19**, 041701, 2007.[pdf reprint](#)
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20. Manela, A., Hadjiconstantinou, N.G., On the Motion Induced in a Gas Confined in a Small-scale Gap Due to Instantaneous Heating. *Journal of Fluid Mechanics*, **593**, 453--462, 2007.[pdf reprint](#)
21. Baker, L. L. Hadjiconstantinou, N.G., Variance-Reduced Particle Methods for Solving the Boltzmann Equation. *Journal of Theoretical and Computational Nanoscience*, **5**, 165-174, 2008.
22. Manela, A., Hadjiconstantinou, N.G., Gas Motion Induced by Unsteady Boundary Heating. *Physics of Fluids*, **20**, 117104, 2008.[pdf reprint](#)
23. Baker, L.L., Hadjiconstantinou, N.G., Variance-reduced Monte Carlo Solutions of the Boltzmann Equation for Low-Speed Gas Flows: A Discontinuous Galerkin Formulation. *International Journal for Numerical Methods in Fluids*, **58**,

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24. Radtke G. A., Hadjiconstantinou, N.G., Variance-reduced Particle Simulation of the Boltzmann Transport Equation in the Relaxation-time Approximation, *Physical Review E*, **79**, 056711, 2009. [pdf reprint](#)

25. Li, Z. R., Liu G. R., Han J., Cheng Y., Chen Y. Z., Wang J-S., Hadjiconstantinou N.G., Analytical Description of Ogston-regime Biomolecule Separation using Nanofilters and Nanopores, *Physical Review E*, **80**, 041911, 2009. [pdf reprint](#)

26. Fayad, G. N., Hadjiconstantinou, N.G., Realistic Brownian Dynamics Simulations of Biological Molecule Separation in Nanofluidic Devices, *Microfluidics and Nanofluidics*, **8**, 521-529, 2010. [pdf reprint](#)

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28. Manela, A., Hadjiconstantinou, N.G., Gas-flow Animation by Unsteady Heating in a Microchannel. *Physics of Fluids*, **22**, 062001, 2010. [pdf reprint](#)

29. Hadjiconstantinou, N.G., Radtke, G.A., Baker, L.L., On Variance-reduced Simulations of the Boltzmann Transport Equation for Small-scale Heat Transfer Applications, *Journal of Heat Transfer*, **132**, 112401, 2010. [pdf reprint](#)

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31. Peraud, J-P. M., Hadjiconstantinou, N.G., Efficient simulation of multidimensional phonon transport using energy-based variance-reduced Monte Carlo formulations, *Physical Review B*, **84**, 205331, 2011. [pdf reprint](#)

32. Radtke G.A., Hadjiconstantinou, N.G., Takata S. and Aoki K., On the Second-order Temperature Jump Coefficient of a Dilute Gas, *Journal of Fluid Mechanics*, **707**, 331-341, 2012. [pdf reprint](#)

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