

GEORGIOS KARAMANIS

CO-FOUNDER AND SENIOR ENGINEER

TRANSPORT PHENOMENA TECHNOLOGIES, LLC

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AREAS OF INTEREST

- Thermal management of electronics; air and liquid cooling applications.
- Fluid flow and heat transfer modeling.
- Electromechanical and electronic devices.

EDUCATION

Tufts University <i>PhD Mechanical Engineering</i>	Medford, MA 2018
Tufts University <i>MS Mechanical Engineering</i>	Medford, MA 2015
Aristotle University of Thessaloniki <i>BS Mechanical Engineering</i>	Thessaloniki, Greece 2012

EXPERIENCE

Transport Phenomena Technologies, LLC <i>Co-Founder and Senior Engineer</i>	Medford, MA October 2017–present
<ul style="list-style-type: none"> • Technical and business activities related to development of hardware and software for thermal management of electronics and optimization of heat sinks and cold plates. • Consulting on transport phenomena, including legal consulting. • Design of custom electromechanical devices. 	
Tufts University <i>Research Assistant Professor (Part-Time)</i>	Medford, MA December 2021–Present
<ul style="list-style-type: none"> • Modeling and experimental techniques pertaining to mass, momentum, and heat transfer, and supercritical drying of silica aerogels. • ME193 Simulation for Mechanical Engineers: Structural, thermal, and fluid flow analysis using commercial software packages (SOLIDWORKS, COMSOL, ANSYS Workbench, MATLAB). 	
<i>Consultant</i>	August 2018–December 2021
<ul style="list-style-type: none"> • Modeling of supercritical drying of silica aerogels. 	
<i>Instructor</i>	Spring Semester 2020
<ul style="list-style-type: none"> • ME193 Simulation for Mechanical Engineers: Structural, thermal, and fluid flow analysis using commercial software packages (SOLIDWORKS, COMSOL, ANSYS Workbench, MATLAB). 	
Imperial College <i>Invited Researcher</i>	London, UK September 2016–December 2016
<ul style="list-style-type: none"> • Modeling of the extended Graetz–Nusselt problem for liquid flow over isothermal parallel ridges; Microchannel liquid cooling in the presence of apparent slip. 	

FUNDING

- • PI on National Science Foundation Phase II SBIR award (\$986,321, #2025882):
- • PI on Massachusetts Clean Energy Center Catalyst award (\$65,000, Spring 2019):

PATENTS

- [1] Karamanis, G., Hodes, M., 2021, “Compliant Thermal Management Devices, Systems, and Methods of Fabrication Thereof.” WO2021178722A1. (Filed)

JOURNAL PUBLICATION

Published

- [1] Kirk, T., **Karamanis, G.**, Crowdy, D., Hodes, M., 2020, "Thermocapillary stress and meniscus curvature effects on slip lengths in ridged microchannels." *Journal of Fluid Mechanics*, 894.
- [2] **Karamanis, G.**, Hodes, M., 2019, "Simultaneous Optimization of an Array of Heat Sinks." *ASME J. Electronic Packaging*, **141**(2).
- [3] **Karamanis, G.**, Hodes, M., 2019, "Conjugate Nusselt Numbers for Simultaneously-Developing Flow through Rectangular Ducts." *ASME J. Heat Transfer*, **141**.
- [4] Luca, E., Marshall, J., **Karamanis, G.**, 2018, "Longitudinal shear flow over a bubble mattress with curved menisci: Arbitrary protrusion angle and solid fraction." *IMA Journal of Applied Mathematics*, **83**(6), p.917–941.
- [5] **Karamanis, G.**, Hodes, M., Kirk, T., Papageorgiou, D., 2017, "Solution of the Extended Graetz–Nusselt Problem for Liquid Flow Over Isothermal Parallel Ridges." *ASME J. Heat Transfer*, **140**(6), p. 061703.
- [6] **Karamanis, G.**, Hodes, M., Kirk, T., Papageorgiou, D., 2017. "Solution of the Graetz-Nusselt problem for liquid flow over isothermal parallel ridges." *ASME Journal of Heat Transfer*, **139**(9), p. 091702.
- [7] Hodes, M., Kirk, T. L., **Karamanis, G.**, MacLachlan, S., 2017. "Effect of thermocapillary stress on slip length for a channel textured with parallel ridges." *Journal of Fluid Mechanics*, 814, pp. 301-324.
- [8] Kadoko, J., **Karamanis, G.**, Kirk, T., Hodes, M., 2017. "One-dimensional analysis of gas diffusion-induced Cassie to Wenzel state transition." *ASME Journal of Heat Transfer*, **139**(12), p. 122006.
- [9] **Karamanis, G.**, Hodes, M., 2016. "Longitudinal-fin heat sink optimization capturing conjugate effects under fully developed conditions." *Journal of Thermal Science and Engineering Applications*, **8**(4), p. 041011.
- [10] Lam, L. S., Hodes, M., **Karamanis, G.**, Kirk, T., MacLachlan, S., 2016. "Effect of meniscus curvature on apparent thermal slip." *ASME Journal of Heat Transfer*, **138**(12), p. 122004.

CONFERENCE PUBLICATION

- [1] Karamanis, G., Hodes, M., "Algorithm for simultaneous optimization of an array of heat sinks." *ITHERM 2018*, Paper #P225.
- [2] Karamanis, G., Dinh, H., Waisbord, N., Hodes, M., "Effects of suction and spillage on supercritical carbon dioxide-based drying of aerogels." *IHTC16*, Paper #24239.
- [3] Karamanis, G., Hodes, M. "Optimal design of longitudinal-fin heat sinks accounting for simultaneously developing flow and conjugate effects." *TPEC-IWHT2017*, Paper #17556.
- [4] Karamanis, G., Hodes, M., Kirk, T., Papageorgiou, D., "Extended Graetz-Nusselt problem for liquid flow in Cassie state over isothermal parallel ridges." *FACM 2017*.
- [5] Karamanis, G., Hodes, M., Kirk, T., Papageorgiou, D., 2016. "Nusselt numbers for fully-developed flow between parallel plates with one plate textured with isothermal parallel ridges." *ASME 2016 HTSC*, pp. V001T05A004.
- [6] Kadoko, J., Karamanis, G., Kirk, T., Hodes, M., 2016. "Analysis of gas diffusion-induced Cassie to Wenzel state transition on a structured surface." *ASME 2016 HTSC*, pp. V002T11A005.
- [7] Karamanis, G. Hodes, M., "Optimal Fin Thickness and Spacing in Fully-Developed Flow Accounting for Non-Uniform Heat Transfer Coefficient." *ASTFE 2015*, Paper #12925.
- [8] Hodes, M., Lam, L., Karamanis, G., MacLachlan, S., "Effect of thermocapillary stress on slip length for poiseuille flow over parallel ridges." *ASTFE 2015*, Paper #12930.
- [9] Hodes, M., Karamanis, G., Steigerwalt Lam, L., MacLachlan, S., Kirk, T., Papageorgiou, D., 2015. "Conformal map and asymptotic solutions for apparent slip lengths in the presence of thermocapillary stress." *23rd ISHMT-ASTFE*, pp. 17-20.

INVITED PRESENTATIONS AND SHORT COURSES

- [1] "Design and Optimization of Heat Sinks." SEMI-THERM 35, San Jose, CA, 2019.
- [2] "Design and Optimization of Heat Sinks." Co-located IEEE Electronic Components & Technology Conference and Intersociety Thermal & Thermomechanical in Electronic Systems Conference, San Diego, CA, 2018. (with Marc Hodes)
- [3] "Evaporation driven flow over parallel ridges." Workshop on Micro & Nano Liquid Flows, University of Warwick, 2016.
- [4] "Nusselt Numbers for Poiseuille Flow over Isothermal Parallel Ridges." Imperial College London-Tufts University Workshop on Microchannel Liquid Cooling in the presence of Apparent Slip, Imperial College London, 2016.

AWARDS

- [1] SoE Award for Outstanding Academic Scholarship, Tufts University, 2018.
- [2] Award for Outstanding Performance in the Graduate Program, Department of Mechanical Engineering, Tufts University, 2018.