



Kentaro Hara

Assistant Professor of Aeronautics and Astronautics

CONTACT INFORMATION

- **Administrative Contract**

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Bio

BIO

Ken Hara is an Assistant Professor of Aeronautics and Astronautics at Stanford University. He received a Ph.D. in Aerospace Engineering and a Graduate Certificate in Plasma Science and Engineering from the University of Michigan, and B.S. and M.S. in Aeronautics and Astronautics from the University of Tokyo. He was a Visiting Research Physicist at Princeton Plasma Physics Laboratory as a Japan Society for the Promotion of Science Postdoctoral Fellow. Prior to joining Stanford, he spent three years as a faculty member in Aerospace Engineering at Texas A&M University. Professor Hara's research interests include electric propulsion, low temperature plasmas, plasma physics (plasma-wall interactions, plasma-wave interactions), data-driven modeling, and computational fluid and plasma dynamics. He is a recipient of the IEEE Nuclear and Plasma Sciences Society Graduate Scholarship Award, the Air Force Young Investigator Program Award, the Department of Energy Early Career Award, and the Office of Naval Research Young Investigator Program Award.

ACADEMIC APPOINTMENTS

- Assistant Professor, Aeronautics and Astronautics

HONORS AND AWARDS

- Young Investigator Program (YIP) Award, Office of Naval Research (2021)
- Kuriki Award for Young Professionals, Electric Rocket Propulsion Society (2019)
- Early Career Research Program Award, Department of Energy (2018)
- JPL Summer Faculty Research Program, Jet Propulsion Laboratory, Caltech (2017)
- Young Investigator Research Program (YIP) Award, Air Force Office of Scientific Research (2017)
- Postdoctoral Fellowship, Japan Society for the Promotion of Science (2015-2016)
- Nuclear and Plasma Sciences Society Graduate Scholarship Award, IEEE (2015)
- Outstanding Student Paper Award, 41st IEEE International Conference on Plasma Science (2014)
- Richard F. and Eleanor A. Towner Prize for Distinguished Academic Achievement, College of Engineering, University of Michigan (2013)

PROFESSIONAL EDUCATION

- PhD, University of Michigan, Aerospace Engineering (2015)

- MS, University of Tokyo , Aeronautics and Astronautics (2010)
- BS, University of Tokyo , Aeronautics and Astronautics (2008)

LINKS

- Plasma Dynamics Modeling Laboratory: <https://pdml.stanford.edu/>

Teaching

COURSES

2021-22

- Fundamentals of Compressible Flow: AA 210A (Aut)
- Introduction to Aeronautics and Astronautics: AA 100 (Win)
- Spacecraft Electric Propulsion: AA 204 (Spr)

2020-21

- Advanced Plasma Physics and Engineering: AA 244B (Spr)
- Introduction to Aeronautics and Astronautics: AA 100 (Aut)
- Rarefied and Ionized Gases: AA 205, ME 362C (Win)

2019-20

- Introduction to Aeronautics and Astronautics: AA 100 (Win)
- Spacecraft Electric Propulsion: AA 204 (Spr)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Martin Lindsey, Wally Maier

Postdoctoral Faculty Sponsor

Mohamad Menati

Doctoral Dissertation Advisor (AC)

Andy Castillo, Andrew Denig, Adnan Mansour

Master's Program Advisor

James Hansen, Andy Huynh, Daniel Kolano, Raymond Lau, Cole Mero, Alka Panda, Kareem Ramadan, Shigemitsu Suzuki, Hailey Szybunka

Doctoral (Program)

Derek Kuldinow, Tal Schwartz, Daniel Troyetsky

Publications

PUBLICATIONS

- **Effects of multiply charged ions on microturbulence-driven electron transport in partially magnetized plasmas** *JOURNAL OF APPLIED PHYSICS*
Kumar, P., Tsikata, S., Hara, K.
2021; 130 (17)
- **2D radial-azimuthal particle-in-cell benchmark for E x B discharges** *PLASMA SOURCES SCIENCE & TECHNOLOGY*
Villafana, W., Petronio, F., Denig, A. C., Jimenez, M. J., Eremin, D., Garrigues, L., Taccogna, F., Alvarez-Laguna, A., Boeuf, J. P., Bourdon, A., Chabert, P., Charoy, T., Cuenot, et al
2021; 30 (7)

- **Nonlinear dynamics of coupled light and particle beam propagation** *Physical Review A*
Kumar, P., Kuldinow, D., Castillo, A., Gerakis, A., Hara, K.
2021; 103 (04)
- **Physics of ExB discharges relevant to plasma propulsion and similar technologies** *PHYSICS OF PLASMAS*
Kaganovich, I. D., Smolyakov, A., Raitses, Y., Ahedo, E., Mikellides, I. G., Jorns, B., Taccogna, F., Gueroult, R., Tsikata, S., Bourdon, A., Boeuf, J., Keidar, M., Powis, et al
2020; 27 (12)
- **Full fluid moment model for low temperature magnetized plasmas** *PHYSICS OF PLASMAS*
Sahu, R., Mansour, A. R., Hara, K.
2020; 27 (11)
- **Non-monotonic double layers and electron two-stream instabilities resulting from intermittent ion acoustic wave growth** *PHYSICS OF PLASMAS*
Vazsonyi, A. R., Hara, K., Boyd, I. D.
2020; 27 (11)
- **Cross-field electron diffusion due to the coupling of drift-driven microinstabilities** *PHYSICAL REVIEW E*
Hara, K., Tsikata, S.
2020; 102 (2)
- **Cross-field electron diffusion due to the coupling of drift-driven microinstabilities.** *Physical review. E*
Hara, K. n., Tsikata, S. n.
2020; 102 (2-1): 023202
- **Self-organized standing waves generated by AC-driven electron cyclotron drift instabilities** *APPLIED PHYSICS LETTERS*
DesJardin, I. M., Hara, K., Tsikata, S.
2019; 115 (23)
- **Two-dimensional hybrid-direct kinetic simulation of a Hall thruster discharge plasma** *PHYSICS OF PLASMAS*
Raisanen, A. L., Hara, K., Boyd, I. D.
2019; 26 (12)
- **2D axial-azimuthal particle-in-cell benchmark for low-temperature partially magnetized plasmas** *PLASMA SOURCES SCIENCE & TECHNOLOGY*
Charoy, T., Boeuf, J. P., Bourdon, A., Carlsson, J. A., Chabert, P., Cuenot, B., Eremin, D., Garrigues, L., Hara, K., Kaganovich, I. D., Powis, A. T., Smolyakov, A., Sydorenko, et al
2019; 28 (10)
- **A data-driven approach to model calibration for nonlinear dynamical systems** *JOURNAL OF APPLIED PHYSICS*
Greve, C. M., Hara, K., Martin, R. S., Eckhardt, D. Q., Koo, J. W.
2019; 125 (24)
- **Ion kinetics and nonlinear saturation of current-driven instabilities relevant to hollow cathode plasmas** *PLASMA SOURCES SCIENCE & TECHNOLOGY*
Hara, K., Treece, C.
2019; 28 (5)
- **An overview of discharge plasma modeling for Hall effect thrusters** *PLASMA SOURCES SCIENCE & TECHNOLOGY*
Hara, K.
2019; 28 (4)
- **Spatiotemporal data fusion and manifold reconstruction in Hall thrusters** *PLASMA SOURCES SCIENCE & TECHNOLOGY*
Eckhardt, D., Koo, J., Martin, R., Holmes, M., Hara, K.
2019; 28 (4)
- **Multispecies plasma fluid simulation for carbon arc discharge** *JOURNAL OF PHYSICS D-APPLIED PHYSICS*
Mansour, A. R., Hara, K.
2019; 52 (10)
- **Non-oscillatory quasineutral fluid model of cross-field discharge plasmas** *PHYSICS OF PLASMAS*
Hara, K.

2018; 25 (12)

- **Test cases for grid-based direct kinetic modeling of plasma flows** *PLASMA SOURCES SCIENCE & TECHNOLOGY*
Hara, K., Hanquist, K.
2018; 27 (6)
- **Amplification due to two-stream instability of self-electric and magnetic fields of an ion beam propagating in background plasma**
Tokluoglu, E. K., Kaganovich, I. D., Carlsson, J. A., Hara, K., Startsev, E. A.
AMER INST PHYSICS.2018
- **Numerical analysis of azimuthal rotating spokes in a crossed-field discharge plasma** *PLASMA SOURCES SCIENCE & TECHNOLOGY*
Kawashima, R., Hara, K., Komurasaki, K.
2018; 27 (3)
- **On limitations of laser-induced fluorescence diagnostics for xenon ion velocity distribution function measurements in Hall thrusters** *PHYSICS OF PLASMAS*
Romadanov, I., Raitses, Y., Diallo, A., Hara, K., Kaganovich, I. D., Smolyakov, A.
2018; 25 (3)
- **Generation of forerunner electron beam during interaction of ion beam pulse with plasma**
Hara, K., Kaganovich, I. D., Startsev, E. A.
AMER INST PHYSICS.2018
- **Kinetic simulations of ladder climbing by electron plasma waves** *PHYSICAL REVIEW E*
Hara, K., Barth, I., Kaminski, E., Dodin, I. Y., Fisch, N. J.
2017; 95 (5): 053212
- **Detailed modeling of electron emission for transpiration cooling of hypersonic vehicles** *JOURNAL OF APPLIED PHYSICS*
Hanquist, K. M., Hara, K., Boyd, I. D.
2017; 121 (5)
- **AMPLIFICATION DUE TO THE TWO-STREAM INSTABILITY OF SELF-ELECTRIC AND MAGNETIC FIELDS OF AN ION OR ELECTRON BEAM PROPAGATING IN BACKGROUND PLASMA**
Tokluoglu, E. K., Kaganovich, I. D., Carlsson, J. A., Hara, K., Powis, A., IEEE
IEEE.2017
- **ADVANCED MAGNETO-GAS-KINETIC SCHEME FOR MHD: ANALYSIS AND COMPARISON TO EXISTING MODELS**
Anderson, S. E., Hara, K., Girimaji, S. S., IEEE
IEEE.2017
- **NUMERICAL MODELING OF ROTATING SPOKES IN HALL THRUSTER DISCHARGE PLASMA**
Kawashima, R., Hara, K., IEEE
IEEE.2017
- **Electron acceleration due to the interaction between a neutralized ion beam and background plasma**
Hara, K., Kaganovich, I. D., IEEE
IEEE.2017
- **Quantitative study of the trapped particle bunching instability in Langmuir waves** *PHYSICS OF PLASMAS*
Hara, K., Chapman, T., Banks, J. W., Brunner, S., Joseph, I., Berger, R. L., Boyd, I. D.
2015; 22 (2)
- **Perturbation analysis of ionization oscillations in Hall effect thrusters** *PHYSICS OF PLASMAS*
Hara, K., Sekerak, M. J., Boyd, I. D., Gallimore, A. D.
2014; 21 (12)
- **Mode transition of a Hall thruster discharge plasma** *JOURNAL OF APPLIED PHYSICS*
Hara, K., Sekerak, M. J., Boyd, I. D., Gallimore, A. D.
2014; 115 (20)
- **One-dimensional hybrid-direct kinetic simulation of the discharge plasma in a Hall thruster** *PHYSICS OF PLASMAS*

Hara, K., Boyd, I. D., Kolobov, V. I.
2012; 19 (11)