KENTARO HARA

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RESEARCH INTERESTS

Electric propulsion; kinetic theory and simulations; plasma physics (oscillations, instabilities, plasma-wall interactions, plasma-wave interactions); low temperature plasmas; computational fluid and plasma dynamics; and numerical algorithm development

EDUCATION

May 2015	Ph.D. in Aerospace Engineering Graduate Certificate in Plasma Science and Engineering University of Michigan, Ann Arbor
Mar 2010	M.Eng. in Aeronautics and Astronautics University of Tokyo, Japan
Mar 2008	B.S. in Aeronautics and Astronautics University of Tokyo, Japan

EMPLOYMENT HISTORY

Jul 2016 -	Assistant Professor Department of Aerospace Engineering Texas A&M University
Aug 2015 - Jul 2016	Visiting Research Physicist, JSPS Postdoctoral Fellow Laboratory for Plasma Nanosynthesis & Theory Department Princeton Plasma Physics Laboratory
May 2015 - Jul 2015	Postdoctoral Research Fellow Nonequilibrium Gas and Plasma Dynamics Laboratory Department of Aerospace Engineering, University of Michigan
Aug 2010 - May 2015	Graduate Student Research Assistant Nonequilibrium Gas and Plasma Dynamics Laboratory Department of Aerospace Engineering, University of Michigan
May 2014 - Aug 2014	Computation Summer Intern Institute for Scientific Computing Research Lawrence Livermore National Laboratory
May 2010 - Aug 2010	Research Assistant Global COE Program, Mechanical Systems Innovation University of Tokyo

Cirriculum Vitae: Ken Hara

TEACHING EXPERIENCE

Spring 2017	Aerospace Electric Propulsion (Aero 489/689), Texas A&M University
Fall 2016	Introduction to Aerothermodynamics (Aero 212), Texas A&M University
Feb 2013 - Apr 2013	Co-instructor, Molecular Gas Dynamics (Aero 532), University of Michigan
Sep 2013 - Dec 2013	Instructor, Introduction to Gas Dynamics (Aero 225), University of Michigan
Apr 2008 - Jul 2008	Teaching Assistant, Space Propulsion, University of Tokyo

AWARDS AND HONORS

Aug 2015	Japan Society for the Promotion of Science (JSPS) Postdoctoral Fellowship
May 2015	AIAA Foundation John Leland Atwood Graduate Award (Declined)
Mar 2015	IEEE Nuclear and Plasma Sciences Society (NPSS) Graduate Scholarship Award
May 2014	Outstanding Student Paper Award, 41st IEEE International Conference on Plasma Science (ICOPS) and the 20th International Conference on High-Power Particle Beams
Feb 2013	Richard F. and Eleanor A. Towner Prize for Distinguished Academic Achievement, College of Engineering, University of Michigan
Oct 2012	Best Presentation Award, 3rd Graduate Symposium of Michigan Institute for Plasma Science and Engineering
2011 - 2012	Michigan Institute for Plasma Science and Engineering Fellowship
2010 - 2013	Japan Student Services Organization Fellowship
Apr 2010	Best Student Award, 41th Annual Meeting of Japan Society for Aeronautical and Space Sciences (JSASS)
2009 - 2010	Honor Scholarship, Japan Student Services Organization

PUBLICATIONS AND PRESENTATIONS

Journal Articles

1. K. Hara, and I. D. Kaganovich, "Electron Acceleration Caused by the Instability due to a Neutralized Ion Beam", (*in preparation*)
2. K. Hanquist, K. Hara, and I. D. Boyd, "Detailed Modeling of Electron Emission for Transpiration Cooling of Hypersonic Vehicles," Journal of Applied Physics (*accepted*)
3. K. Hara, T. Chapman, J. W. Banks, S. Brunner, I. Joseph, R. L. Berger, and I. D. Boyd, "Quantitative study of trapped particle bunching instability in Langmuir waves", Physics of Plasmas **22**, 022104, (2015)
4. K. Hara, M. J. Sekerak, I. D. Boyd, and A. D. Gallimore, "Perturbation analysis of ionization oscillations in Hall effect thrusters", Physics of Plasmas **21**, 122103, (2014)
5. K. Hara, M. J. Sekerak, I. D. Boyd, and A. D. Gallimore, "Mode transition of a Hall thruster discharge plasma", Journal of Applied Physics **115**, 203304 (2014)
6. K. Hara, I. D. Boyd, and V. I. Kolobov, "One-dimensional hybrid-direct kinetic simulation of the discharge plasma in a Hall thruster", Physics of Plasmas **19**, 113508 (2012)

7. S. Cho, S. Yokota, K. Hara, D. Takahashi, Y. Arakawa, K. Komurasaki, and A. Kobayashi, "A Development of Lifetime Evaluation Method Using Multilayer Coating Chip," Transaction of the Japan Society for Aeronautics and Space Science, Aerospace Technology Japan, Japan Society for Aeronautics and Space Science, **8**, Pb_51-Pb_54 (2010)
8. S. Cho, S. Yokota, Y. Fukushima, K. Hara, Y. Arakawa, K. Komurasaki, and A. Kobayashi, "Application of lifetime evaluation method using multilayer coated chips", Plasma Application and Hybrid Functionally Materials, Institute of Applied Plasma Science **18**, 84 (2009)
9. M. Lempke, S. Yokota, M. Matsui, K. Hara, K. Komurasaki, and Y. Arakawa, "LIF Spectroscopy of a Hall thruster plasma plume", Plasma Application and Hybrid Functionally Materials, **17** (2008)

Conferences

1. R. Kawashima, J. Bak, K. Hara, K. Komurasaki, and H. Koizumi, "Effects of Azimuthal Non-uniformity on the Hall Thruster Discharge," IEPC-2017-527, 35th International Electric Propulsion Conference, Atlanta, GA, October 2017 (accepted)
2. A. Kawasaki and K. Hara, "Development of 1D, time-dependent, multi-fluid model for Hall thruster discharge plasma," IEPC-2017-508, 35th International Electric Propulsion Conference, Atlanta, GA, October 2017 (accepted)
3. K. Hara and K. Kubota, "Direct kinetic simulation of ion acoustic turbulence in cathode plume," IEPC-2017-496, 35th International Electric Propulsion Conference, Atlanta, GA, October 2017 (accepted)
4. K. Hara and S. Cho, "Radial-azimuthal particle-in-cell simulation of a Hall effect thruster," IEPC-2017-495, 35th International Electric Propulsion Conference, Atlanta, GA, October 2017 (accepted)
5. I. Romadanov, A. Smolyakov, A. Diallo, Y. Raitses, and K. Hara, "Time-resolved measurements of modulated breathing oscillations in Hall Thruster," IEPC-2017-267, 35th International Electric Propulsion Conference, Atlanta, GA, October 2017 (accepted)
6. A. Raisanen, K. Hara and I. D. Boyd, "Modeling Electrons in a Two-Dimensional, Hybrid-Direct Kinetic Simulation of the Plasma Discharge in a Hall Thruster," IEPC-2017-221, 35th International Electric Propulsion Conference, Atlanta, GA, October 2017 (accepted)
7. H. Dragnea, K. Hara and I. D. Boyd, "Development of a 2D Axisymmetric Electron Fluid Model in Hall Thrusters," 2017 AIAA Propulsion and Energy Forum and Exposition, Atlanta, GA, July 2017 (abstract submitted)
8. A. Raisanen, K. Hara and I. D. Boyd, "Assessment of a Two-Dimensional Hybrid-Direct Kinetic Simulation of a Hall Thruster," 2017 AIAA Propulsion and Energy Forum and Exposition, Atlanta, GA, July 2017 (abstract submitted)
9. K. Hara, I. Barth, E. Kaminski, I. Dodin, and N. Fisch, "Vlasov simulations of ladder climbing and autoresonant acceleration of Langmuir waves," 58th Annual Meeting of the APS Division of Plasma Physics, San Jose, CA, October 2016. (poster)
10. K. Hara, I. Kaganovich and Y. Raitses, "Fluid simulation of carbon arc plasma," 69th Annual Gaseous Electronics Conference, Bochum, Germany, October 2016.
11. K. Hara, S. Keller, and Y. Raitses, "Measurements and theory of driven breathing oscillations in a Hall effect thruster," AIAA Propulsion and Energy Forum and Exposition 2016, AIAA-2016-4532, Salt Lake City, UT, July 2016.

12. K. Hara and S. Cho, "Development of a hybrid particle-continuum kinetic method for Hall thruster discharge plasmas," AIAA Propulsion and Energy Forum and Exposition 2016, AIAA-2016-4621, Salt Lake City, UT, July 2016.
13. A. Raisanen, K. Hara and I. D. Boyd, "Comparing Two-Dimensional, Axisymmetric, Hybrid-Direct Kinetic and Hybrid-Particle-in-Cell Simulations of the Discharge Plasma in a Hall Thruster," AIAA Propulsion and Energy Forum and Exposition 2016, AIAA-2016-4620, Salt Lake City, UT, July 2016.
14. R. Kawashima, K. Hara, K. Komurasaki, and H. Koizumi, "A Unified Model for Axial-Radial and Axial-Azimuthal Hall Thruster Simulations," AIAA Propulsion and Energy Forum and Exposition 2016, AIAA-2016-4726, Salt Lake City, UT, July 2016.
15. K. M. Hanquist, K. Hara, and I. D. Boyd, "Modeling of Electron Transpiration Cooling for Hypersonic Vehicles," 46th AIAA Thermophysics Conference, AIAA Paper 2016-4433, June 2016.
16. K. Hara and I. D. Kagaonovich, "Electron Acceleration due to Ion Beam Driven Instability," 57th Annual Meeting of APS Division of Plasma Physics, Savannah, GA, November 2015 (Poster)
17. H. Dragnea, K. Hara and I. D. Boyd, "A 9-Point Finite Volume Potential Solver," 68th Annual Gaseous Electronics Conference, Honolulu, HI, October 2015
18. K. Hara and I. D. Boyd, "Axial-azimuthal hybrid-direct kinetic simulation of Hall effect thrusters," IEPC-2015-286, 34th International Electric Propulsion Conference, Kobe, Japan, July 2015
19. K. Hara, M. J. Sekerak, A. D. Gallimore, and I. D. Boyd, "Breathing mode in Hall effect thrusters," IEPC-2015-283, 34th International Electric Propulsion Conference, Kobe, Japan, July 2015
20. K. Hara, T. Chapman, J. W. Banks, S. Brunner, I. Joseph, R. L. Berger, and I. D. Boyd, "Vlasov simulations of negative mass instability of Langmuir waves", 56th Annual Meeting of APS Division of Plasma Physics, New Orleans, LA, November 2014 (Poster) **(Student travel grant)**
21. K. Hara, I. D. Boyd, M. J. Sekerak, and A. D. Gallimore, "Discharge oscillation mode transition of a Hall thruster", 41st IEEE International Conference on Plasma Science and the 20th International Conference on High-Power Particle Beams, Washington D.C., May 2014. **(Awarded)**
22. K. Hara and I. D. Boyd, "Front tracking scheme for direct kinetic simulations", 41st IEEE International Conference on Plasma Science and the 20th International Conference on High-Power Particle Beams, Washington D.C., May 2014.
23. K. Hara, I. D. Boyd, and I. D. Kaganovich, "A direct Vlasov simulation of nonlinear plasma waves", 55th Annual Meeting of APS Division of Plasma Physics, Denver, CO, November, 2013. (Poster)
24. K. Hara and I. D. Boyd, "Low Frequency Oscillation Analysis of a Hall Thruster Using a One-Dimensional Hybrid-Direct Kinetic Simulation", IEPC Paper 2013-266, 33rd International Electric Propulsion Conference, Washington DC, October, 2013.
25. K. Hara and I. D. Boyd, "Analysis of Secondary Electron Emission of Dielectric Materials Using a Direct Kinetic Simulation", IEEE Pulsed Power and Plasma Science Conference (40th IEEE International Conference on Plasma Science) , San Francisco, CA, June, 2013.
26. K. Hara, I. D. Boyd, and V. I. Kolobov, "Investigation of Presheath and Sheath Using a Full-Vlasov Simulation", 65th Annual Gaseous Electronics Conference, Austin, TX, October, 2012.
27. K. Hara, I. D. Boyd, and V. I. Kolobov, "One-dimensional hybrid-Vlasov simulation of Hall thrusters", 48th AIAA Joint Propulsion Conference, Atlanta, GA, AIAA-2012-4313, August, 2012.

28. S. Varadan, K. Hara, B. Van Leer, and E. Johnsen, "Development of Discontinuous Galerkin Method for Supersonic flows," 1st High-Order CFD Workshop, 50th AIAA Aerospace Sciences Meeting, Nashville, TN, January, 2012.
29. K. Hara, S. Yokota, S. Cho, D. Takahashi, K. Komurasaki, and Y. Arakawa, "Boundary Conditions in a Hall thruster Ion Trajectory Simulation" *(in Japanese)*, 41th Annual Meeting of Japan Society for Aeronautical and Space Sciences, Tokyo, Japan, April, 2010. **(Awarded)**
30. Y. Fukushima, S. Yokota, D. Takahashi, K. Hara, S. Cho, K. Komurasaki, and Y. Arakawa, "Discharge Stabilization Method of an Anode Layer Type Hall Thruster by Non-uniform Propellant Flow"IEPC-2009-148, the 31th International Electric Propulsion Conference, Ann Arbor, MI, September, 2009.
31. S. Yokota, K. Hara, S. Cho, D. Takahashi, K. Komurasaki, and Y. Arakawa, "Measurement of Ion Number Density and Velocity Distribution in an Anode-layer Type Hall Thruster by Laser Induced Florescence Method", IEPC-2009-149, the 31th International Electric Propulsion Conference, Ann Arbor, MI, September, 2009.

Symposiums and Talks

1. K. Hara, "Direct kinetic simulation of nonlinear plasma waves and Hall thruster discharge plasmas," International Conference on Phenomena in Ionized Gases (ICPIG), Lisbon, Portugal, July 2017. (Invited)
2. K. Hara, "Plasma Dynamics of Electric Propulsion for In-Space Missions," 1st RIKEN Interdisciplinary Symposium for Young Scientists, RIKEN, Yokohama, Japan, March 2017. (Invited)
3. K. Hara, "Modeling of the Plasma Flows in Electric Propulsion Devices," Aerospace Engineering Seminar Series, Texas A&M University, College Station, TX, January 2017.
4. K. Hara, "Hybrid and full kinetic simulation of Hall thruster discharge plasma", Electric Propulsion and Power Group, NASA Glenn Research Center, January 2017.
5. K. Hara, "Development of grid-based direct kinetic method for nonlinear plasma waves and Hall Thruster discharge plasma", Center for Large-Scale Scientific Simulations (CLASS), Texas A&M University, Dec 2016.
6. K. Hara, "Kinetic simulations of Nonlinear plasma waves", 7th Annual meeting of DOE Plasma Science Center, Baltimore, MD, May 2016.
7. K. Hara, "Stabilization of Hall thruster discharge oscillation," Space Transport Symposium, Sagamihara, Japan, January 2016. (in Japanese)
8. K. Hara, "Vlasov simulations: Numerical and Physical Aspects," Computations Group, Japan Aerospace Exploration Agency, Chofu, Tokyo, January 2016. (Informal seminar; in Japanese)
9. K. Hara, "Breathing mode oscillations: Numerical simulations and theory," Electric Propulsion Group, Jet Propulsion Laboratory, January 2016. (Informal seminar)
10. I. D. Kagaonovich and K. Hara, "Electron Acceleration due to Ion Beam Driven Instability," Theory Department Seminar, Princeton Plasma Physics Laboratory, December 2015.
11. K. Hara, "Hybrid-Direct Kinetic Simulation of Hall Thruster Discharge Plasmas", 6th Annual meeting of DOE Plasma Science Center, Baltimore, MD, June, 2015.
12. K. Hara, "Direct kinetic simulation of the discharge plasma for electric propulsion and nonlinear plasma waves", Engineering Graduate Symposium, University of Michigan, Ann Arbor, MI, Oct, 2014.
13. K. Hara and I. D. Boyd, "Kinetic simulation of trapped particle bunching instability in nonlinear plasma waves", 5th Graduate Symposium of Michigan Institute for Plasma Science and Engineering, Ann Arbor, MI, Oct, 2014.

14. K. Hara and I. D. Boyd, "Direct Kinetic Simulation of the Discharge Plasma in a Hall Effect Thruster", 5th Annual meeting of DOE Plasma Science Center, Baltimore, MD, May, 2014.
15. I. D. Boyd, K. Hara and C. Galitzine, "Kinetic Simulations of Distribution Functions in Rarefied Plasmas", 4th Annual meeting of DOE Plasma Science Center, Baltimore, MD, May, 2013.
16. K. Hara, I. D. Boyd, V. I. Kolobov, and R. R. Arslanbekov, "Collisionless Sheath Problem for Testing Vlasov Solvers", Algorithm and Model Verification and Validation for Kinetic Plasma Simulation Codes", East Lansing, MI, November, 2012.
17. K. Hara, I. D. Boyd, and V. I. Kolobov, "Kinetic Simulations of Partially Magnetized Plasmas in a Hall Thruster", 3rd Graduate Symposium of Michigan Institute for Plasma Science and Engineering, East Lansing, MI, October, 2012. (poster) **(Awarded)**
18. K. Hara, I. D. Boyd, and V. I. Kolobov, "Development of a fully-kinetic Vlasov simulation for partially magnetized plasma", 3rd Annual meeting of DOE Plasma Science Center, Princeton, NJ, May, 2012. (poster)
19. K. Hara, I. D. Boyd, and V. I. Kolobov, "1D hybrid-Vlasov simulation for Hall thrusters", 2nd Graduate Symposium of Michigan Institute for Plasma Science and Engineering, Ann Arbor, MI, September, 2011. (poster)
20. K. Hara, I. D. Boyd, and V. I. Kolobov, "Development of a Vlasov simulation for partially magnetized plasma", 2nd Annual meeting of DOE Plasma Science Center, Ann Arbor, MI, May, 2011. (poster)

Ph.D. Dissertation

- Development of Grid-Based Direct Kinetic Method and Hybrid Kinetic-Continuum Modeling of Hall Thruster Discharge Plasmas. Advisor: Prof Iain D. Boyd; Committee Members: Prof Alec D. Gallimore, Prof Mark J. Kushner, Dr Igor D. Kaganovich

OTHER ACTIVITIES

Affiliation:

- American Institute of Aeronautics and Astronautics (AIAA)
- American Physical Society (APS)
- Institute of Electrical and Electronics Engineers (IEEE)

Journal Reviewer:

- IEEE Transaction on Plasma Science
- AIAA Journal of Propulsion and Power
- Journal of Applied Physics
- Physics of Plasmas
- Review of Scientific Instruments
- Contributions to Plasma Physics
- Physics Letters A
- Plasma Sources Science and Technology

Languages: English (Fluent), Japanese (Native)