Aram H. Markosyan

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Academic Experience

University of Michigan, USA
2014-present Research Fellow, Department of Electrical Engineering and Computer Science
Centrum Wiskunde & Informatica, Netherlands
2010-2014 PhD candidate and researcher, Multiscale Dynamics (MD) group
Affiliate: Eindhoven University of Technology, Department of Applied Physics
Centrum Wiskunde & Informatica, MD

Education

2010-2014 PhD degree in Applied Physics, Eindhoven University of Technology, Netherlands
Thesis title: Modeling multiple time scales in streamer discharges.
Thesis Advisors: Prof. U.M. Ebert and Dr. S. Dujko
2008-2009 Master of Sciences and Technologies, Mathematics and Applications, Numerical Analysis and Partial Differential Equations, University Pierre and Marie Curie (Paris 6), France
Thesis title: SVI implied variance parameterization.
Thesis Advisors: Dr. C. Martini (Zeliade Systems), Prof. O. Pironneau (Paris 6), Prof. H. Berestycki (Paris 6)
2006-2008 Master's degree in Mathematics, Yerevan State University, Armenia
Thesis title: Existence of the Minimal Element of the Class of Super-solutions in the One - Phase Parabolic Free Boundary Problem in Convex Domain.
Thesis Advisors: Assoc. Prof. Michael Poghosyan
2002-2006 Bachelor's degree in Mathematics, Yerevan State University, Armenia
Diploma earned with excellence.

Industrial Experience

2009 March-2009 October Intern, Zeliade Systems, Paris, France

Referee/Reviewer

Computer Physics Communications
Plasma Science and Technology
IEEE Transactions on Plasma Science

Professional Society Memberships

American Physical Society (member)
IEEE Nuclear and Plasma Sciences Society (member)
American Mathematical Society (member)
European Consortium for Mathematics in Industry (member)
Werkgemeenschap Scientific Computing (member)

Areas of Professional Interest

Numerical Methods and Scientific Computing, Adaptive Mesh Refinement, Hyperbolic Problems with Source Terms, Free Boundary Problems, Low Temperature Plasmas, Plasma Chemistry, Laser Physics, Pulsed Power Plasmas, High Performance Computing.

Technical Skills

C/C++(STL, QT, BOOST), Python, Fortran, MPI, OpenMP, Matlab, Mathematica, Tex.

Grants

1. Short visit grant from European Science Foundation (ESF) No. 5297 (13-20.01.2013) within the activity entitled 'Thunderstorm effects on the atmosphere-ionosphere system'. Collaborating Research with F. J. Gordillo-Vázquez and A. Luque.
2. Short visit grant from European Science Foundation (ESF) No. 5697 (23-29.06.2013) within the activity entitled 'Thunderstorm effects on the atmosphere-ionosphere system'. Collaborating Research with F. J. Gordillo-Vázquez and A. Luque.
3. Short visit grant from European Science Foundation (ESF) No. 5698 (01-08.06.2013) within the activity entitled 'Thunderstorm effects on the atmosphere-ionosphere system'. Collaborating Research with F. J. Gordillo-Vázquez and A. Luque.

Spoken Languages

Armenian, Russian, English, French

Activities and Hobbies

Music, modern art, philosophy, psychoanalysis, literature, digital photography.

Publications and Talks

Papers in international journals

1. J. Zhang, A.H. Markosyan, M. Seeger, E.M. van Veldhuizen, E.J.M. van Heesch and U. Ebert, Numerical and experimental investigation of recovery in super-critical N_2, *Plasma Sources Sci. Technol.* **24** 025008 (2015)
2. A.H. Markosyan, A. Luque, F. J. Gordillo-Vázquez, U. Ebert, PumpKin: A tool to find principal pathways in plasma chemical models, *Computer Physics Communications* **185**, pp. 2697-2702, (2014)
3. S. Nijdam, E. Takahashi, A.H. Markosyan and U. Ebert, Investigation of positive streamers by double pulse experiments, effects of repetition rate and gas mixture, *Plasma Sources Sci. Technol.* **23** 025008 (2014)
4. S. Dujko, A.H. Markosyan, R.D. White, U. Ebert**,** High order fluid model for streamer discharges: I. Derivation of model and transport data, *J. Phys. D: Appl. Phys.* **46** 475202 (2013)
5. A.H. Markosyan**,** S. Dujko, U. Ebert, High order fluid model for streamer discharges: II. Numerical solution and investigation of planar fronts, *J. Phys. D: Appl. Phys.* **46** 475203 (2013)

In submission

1. A.H. Markosyan, J. Teunissen, S. Dujko and U. Ebert, Comparing fluid models for streamer discharges, submitted to *Plasma Sources Sci. Technol*.
2. A.H. Markosyan, M.J. Kushner, Plasma Formation During Operation of a Diode Pumped Alkali Laser, submitted to the 22nd International Symposium on Plasma Chemistry, ISPC22, July 5 - 10, 2015, Antwerp, Belgium [3 pages]
3. R. Le Picard, A.H. Markosyan, D.H. Porter, M.J. Kushner, S.L. Girshick, Numerical Simulation of Capacitively-Coupled RF Plasma Flowing Through a Tube for the Synthesis of Silicon Nanocrystals, submitted to the 22nd International Symposium on Plasma Chemistry, ISPC22, July 5 - 10, 2015, Antwerp, Belgium [3 pages]
4. E.J.M. van Heesch, J. Zhang, F.J.C.M. Beckers, T. Huiskamp, W.F.L.M. Hoeben, E.M. van Veldhuizen, A.J.M. Pemen, A.H. Markosyan, U. Ebert, Super-critical and high-pressure media for high-repetition rate plasma switch, submitted to the 20th IEEE Pulsed Power Conference (PPC) and the 26th IEEE Symposium on Fusion Engineering (SOFE), PPC 2015 SOFE, May 31 - June 4, 2015, Austin, Texas, USA
5. S. Dujko, A.H. Markosyan and U. Ebert, Streamers in rare gases, ready for submission to *J. Phys. D*.

Contributed papers and abstracts at international conferences

Full refereed proceedings:

1. S. Dujko, A.H. Markosyan, U. Ebert, Propagation of negative planar streamer fronts in noble

gases; proceedings of the 27th Summer School and Int. Symposium on the Physics of Ionized Gases, SPIG 2014, August 26 - 29, 2014, Belgrade, Serbia [4 pages]

2. E.J.M. van Heesch, Jin Zhang, A.H. Markosyan, Takao Namihira, F.J.C.M. Beckers, T. Huiskamp, W.F.L.M. Hoeben, A.J.M. Pemen, U. Ebert, Supercritical Fluids for High-power Switching; proceedings of IEEE International Power Modulator and High Voltage Conference, IPMHVC 2014, June 1 - 5, 2014, Santa Fe, NM, USA [4 pages]
3. S. Dujko, A. Markosyan, U. Ebert, High order fluid model for negative planar streamer fronts in rare gases, Proceedings of the 9th EU-Japan Joint Symposium on Plasma Processing, JSPP2014, January 19-23, 2014, Bohinjska Bistrica, Slovenia [4 pages]
4. S. Dujko, D. Bošnjaković, J. Mirić, I. Simonović, Z.M. Raspopović, R.D. White, A.H. Markosyan, U. Ebert, Z.Lj. Petrović, Recent results from studies of non-equilibrium electron transport in modeling of low-temperature plasmas and particle detectors, Proceedings of the 9th EU-Japan Joint Symposium on Plasma Processing, JSPP2014, January 19-23, 2014, Bohinjska Bistrica, Slovenia [4 pages]
5. A.H. Markosyan, A. Luque, F. J. Gordillo-Vázquez, U. Ebert, Analyzing atmospheric kinetic pathways using PumpKin, Proceedings of the European Planetary Science Congress 2013, EPSC2013, September 08-13, 2013, London, United Kingdom; Vol. 8, EPSC2013-655 [2 pages]
6. A.H. Markosyan, J. Zhang, B. van Heesch, U. Ebert, Streamer to spark transition in supercritical N_2, Proceedings of the XXth Symposium on Physics of Switching Arc, FSO 2013, September 2-6, 2013, Nove Mesto na Morave, Czech Republic [4 pages]
7. A.H. Markosyan, A. Luque, F. J. Gordillo-Vázquez, U. Ebert, PumpKin: A tool to find principal pathways in plasma chemical models, Proceedings of the XXXI International Conference on Phenomena in Ionized Gases, ICPIG 2013, July 14-19, 2013, Granada, Spain [2 pages]
8. A. Markosyan, S. Dujko, U. Ebert, Derivation and test of high order fluid model for streamer discharges, Proceedings of the Scientific Computing in Electrical Engineering, SCEE2012, September 11-14, 2012, ETH Zurich, Switzerland; pp. 107-108 [2 pages]
9. S. Dujko, A. Markosyan, R.D. White, U. Ebert, High order fluid model for streamer discharges, Proceedings of the 26th Summer School and International Symposium on the Physics of Ionized Gases, SPIG 2012, August 27-31, 2012, Zrenjanin, Serbia; ISBN: 978-86-7031-244-9, pp. 345-348 [4 pages]
10. A. Markosyan, S. Dujko, U. Ebert, High order fluid model for ionization fronts in streamer discharges, Proceedings of the XXI Europhysics Conference on Atomic and Molecular Physics of Ionized Gases, XXIth ESCAMPIG, July 10-14, 2012, Viana do Castelo, Portugal [2 pages]

Talks:

1. N.Y. Babaeva, A.H. Markosyan, O. Zatsarinny, K. Bartschat, M.J. Kushner, Plasma formation during operation of a diode pumped alkali laser; proceedings of the 67th Annual Gaseous Electronics Conference, GEC 2014, November 3 - 7, 2014, Raleigh, North Carolina, USA
2. A.H. Markosyan, J. Teunissen, S. Dujko, U. Ebert, Testing fluid models of different order on

streamer discharges; proceedings of the 67th Annual Gaseous Electronics Conference, GEC 2014, November 3 - 7, 2014, Raleigh, North Carolina, USA

3. A.H. Markosyan, J. Teunissen, S. Dujko, U. Ebert, Comparison of various fluid models for streamer discharge; proceedings of the Plasma Processing Science Gordon Research Seminar, GRS 2014, July 26 - 27, 2014, Bryant University, Smithfield, RI, USA
4. *Comparison of various fluid models for streamer discharge*, A.H. Markosyan, J. Teunissen, S. Dujko, U. Ebert; proceedings of the Plasma Processing Science Gordon Research Seminar, GRS 2014, July 26 - 27, 2014, Bryant University, Smithfield, RI, USA
5. A.H. Markosyan, A. Luque, F. J. Gordillo-Vázquez, U. Ebert, PumpKin: A tool to find principal pathways in plasma chemical models, Proceedings of the Physics@FOM, January 21 - 22, 2014, Veldhoven, Netherlands
6. A.H. Markosyan, A. Luque, F. J. Gordillo-Vázquez, U. Ebert, PumpKin: A tool to find principal pathways in plasma chemical models, Bulletin of the American Physical Society, 66th Annual Gaseous Electronics Conference, GEC 2013, September 30 - October 4, 2013, Princeton, New Jersey, USA; vol. 58, No. 8, p. 72
7. A.H. Markosyan, J. Zhang, B. van Heesch, U. Ebert, Numerical investigation of voltage recovery after breakdown supercritical nitrogen, Proceedings of the XXth Symposium on Physics of Switching Arc, FSO 2013, September 2-6, 2013, Nove Mesto na Morave, Czech Republic
8. *[invited talk]* A.H. Markosyan, S. Dujko, U. Ebert, Challenges in fluid modeling of streamer discharges, Proceedings of the Werkgemeenschap Scientific Computing spring meeting 2013, WSC Spring Meeting 2013, May 17, 2013, Amsterdam, Netherlands
9. A. Markosyan**,** S. Dujko, U. Ebert, Numerical study of high order fluid model for streamer discharges, Proceedings of the 25th Symposium Plasma Physics & Radiation Technology, March 5 - 6, 2013, Lunteren, Netherlands
10. A. Markosyan, S. Dujko, R. White, J. Teunissen, U. Ebert, High order fluid model for streamer discharges, Bulletin of the American Physical Society, 65th Annual Gaseous Electronics Conference, GEC 2012, October 22-26, 2012, Austin, Texas, USA; vol. 57, No. 8, p. 53

Posters

1. A.H. Markosyan, S. Dujko, U. Ebert, 2D streamer simulations using the high order fluid model; proceedings of the 67th Annual Gaseous Electronics Conference, GEC 2014, November 3 - 7, 2014, Raleigh, North Carolina, USA
2. R. Le Picard, A.H. Markosyan, D. Porter, M.J. Kushner, S.L. Girshick, Numerical simulation of 2D capacitively-coupled RF plasma for the synthesis of silicon nanocrystals; proceedings of the 67th Annual Gaseous Electronics Conference, GEC 2014, November 3 - 7, 2014, Raleigh, North Carolina, USA
3. A.H. Markosyan, A. Luque, F. J. Gordillo-Vázquez, U. Ebert, PumpKin: A tool to find principal pathways in plasma chemical models, proceedings of the 5th Annual MIPSE Graduate Student Symposium, October 8, 2014, Ann Arbor, USA; p15

4. A.H. Markosyan, J. Teunissen, S. Dujko, U. Ebert, Comparison of various fluid models for streamer discharge; proceedings of the Plasma Processing Science Gordon Research Conference, GRC 2014, July 27 - August 1, 2014, Bryant University, Smithfield, RI, USA
5. A.H. Markosyan, J. Teunissen, S. Dujko, U. Ebert, Comparison of various fluid models for streamer discharge, Proceedings of the Plasma Processing Science Gordon Research Conference (GRC 2014), July 27 - August 1, 2014, Bryant University, Smithfield, RI, USA
6. A.H. Markosyan, J. Teunissen, S. Dujko, U. Ebert, Comparison of various fluid models for streamer discharge, Proceedings of the Plasma Processing Science Gordon Research Seminar (GRS 2014), July 26-27, 2014, Bryant University, Smithfield, RI, USA
7. A.H. Markosyan, J. Teunissen, S. Dujko, U. Ebert, Fluid models and the reality, Proceedings of the 26th Symposium Plasma Physics & Radiation Technology, March 11 - 12, 2014, Lunteren, Netherlands; A19
8. A.H. Markosyan, J. Teunissen, S. Dujko, U. Ebert, Comparing fluid model for streamer discharges, Bulletin of the American Physical Society, 66th Annual Gaseous Electronics Conference, GEC 2013, September 30 - October 4, 2013, Princeton, New Jersey, USA; vol. 58, No. 8, p. 20
9. A.H. Markosyan, J. Zhang, B. van Heesch, U. Ebert, Investigating streamer to spark transition in supercritical N_2, Bulletin of the American Physical Society, 66th Annual Gaseous Electronics Conference, GEC 2013, September 30 - October 4, 2013, Princeton, New Jersey, USA; vol. 58, No. 8, p. 25
10. S. Dujko, Z.Lj. Petrović, R.D. White, D. Bošnjaković, J. Mirić, A.H. Markosyan, U. Ebert, Non-conservative electron transport in gases and its application in modelling of non-equilibrium plasmas and particle detectors, Proceedings of the XVII International Workshop on Low-Energy Positron and Positronium Physics and the XVIII International Symposium on Electron-Molecule Collisions and Swarms, POSMOL 2013, July 19-21, 2013, Kanazawa, Japan
11. A.H. Markosyan, S. Dujko, R. U. Ebert, High order fluid model for streamer discharges in rare gases, Proceedings of the XVII International Workshop on Low-Energy Positron and Positronium Physics and the XVIII International Symposium on Electron-Molecule Collisions and Swarms, POSMOL 2013, July 19-21, 2013, Kanazawa, Japan
12. A. Markosyan, J. Zhang, B. van Heesch, U. Ebert, Investigating heating dynamics in sparks, Proceedings of the European Geoscience Union General Assembly 2013, EGU2013, April 07-12, 2013, Vienna, Austria
13. A. Markosyan, J. Zhang, B. van Heesch, U. Ebert, On the heating dynamics in sparks, Proceedings of the Physics@FOM, January 22 - 23, 2013, Veldhoven, Netherlands; p.41
14. A. Markosyan, J. Zhang, B. van Heesch, U. Ebert, Investigating voltage recovery after breakdown supercritical nitrogen, Bulletin of the American Physical Society, 65th Annual Gaseous Electronics Conference, GEC 2012, October 22-26, 2012, Austin, Texas, USA; vol. 57, No. 8, p. 84
15. A. Markosyan, S. Dujko, R. White, J. Teunissen, U. Ebert, High order fluid model for streamer discharges, Bulletin of the American Physical Society, 65th Annual Gaseous Electronics Conference, GEC 2012, October 22-26, 2012, Austin, Texas, USA; vol. 57, No. 8, p. 53
16. [award for poster] A. Markosyan, S. Dujko, U. Ebert, Why do we need high order fluid model for

streamer discharges? Proceedings of the 37th Woudschoten conference, WSC Conference 2012, October 3-5, 2012, Zeist, Netherlands

17. A. Markosyan, S. Dujko, U. Ebert, High order fluid model for simulations of streamer and sprites, Proceedings of the 1st Thunderstorm Effects on the Atmosphere-Ionosphere System Summer School, TEA-IS, June 17-22, 2012, Los Alamos, Torremolinos (Malaga), Spain.
18. S. Dujko, A. Markosyan, R.D. White, Z.Lj. Petrovic, U. Ebert, High-order fluid model of streamer discharges in molecular nitrogen, Bulletin of the American Physical Society, 43rd Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics, DAMOP 2012, June 4-8, 2012, Anaheim, California; vol. 57, No. 5, p. 118
19. A. Markosyan, S. Dujko, U. Ebert, High order fluid model for ionization fronts in streamer discharges, Proceedings of the 24th Symposium Plasma Physics & Radiation Technology, March 6 - 7, 2012, Lunteren, Netherlands; p. B7
20. A. Markosyan, S. Dujko, W. Hundsdorfer, U. Ebert, A high order density model for streamer discharges, Proceedings of the Physics@FOM, January 17 - 18 2012, Veldhoven, Netherlands; p. 250
21. A. Markosyan, S. Dujko, W. Hundsdorfer, U. Ebert, A high order density model for streamer discharges, Proceedings of the 14th Euregional WELTPP Workshop on the Exploration of Low Temperature Plasma Physics, December 1 - 2, 2011, “Rolduc” Kerkrade, Netherlands; P42