

## PABLO FAJARDO, Ph. D.

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CONTACT INFORMATION	Associate Professor Dept. Bioingeniería e Ing. Aeroespacial. Universidad Carlos III de Madrid Av. de la Universidad, 30. 28911 Leganés, Spain.	<b>Email:</b> pfajardo@ing.uc3m.es <b>Phone:</b> +34916248239  <i>Last update: October 2021</i>
RESEARCH INTERESTS	Numerical methods, Plasma Propulsion, Experimental characterization of plasmas, CFD, Fluid-Structure Interaction, Aeroelasticity.	
EDUCATION	<b>Ph.D. in Aeronautical Engineering, July 2012</b>  Universidad Politécnica de Valencia, Spain  PhD Thesis: <i>Methodology for the Numerical Characterization of a Radial Turbine under Steady and Pulsating Flow</i>  <b>Diploma Course in Fluid Mechanics (Master in Research), July 2008</b>  von Karman Institute for Fluid Dynamics, Belgium  Research Project: <i>Supersonic and High Pressure Plasma Testing</i>  <b>MSc/Bc in Aeronautical Engineering, July 2007</b>  5 years programe; ETSIA, U. Politécnica de Madrid, Spain  Minor in Aerospace Vehicles	
PROFESSIONAL EXPERIENCE	<b>Universidad Carlos III de Madrid, Leganés, Spain</b>  Associate Professor (Associate Professor Level) July 2017 to present  Director of the M.Sc. in Aeronautical Engineering April 2014 to present  First Deputy-Director of the School of Engineering May 2018 to present  Deputy-Director of the School of Engineering June 2014 to May 2018  Visiting Professor (Associate Professor Level) July 2013 to July 2017  <b>Universidad Politécnica de Valencia, Valencia, Spain</b>  Researcher and Assistant Lecturer September 2008 to June 2013	
REFEREED JOURNAL PUBLICATIONS	<ol style="list-style-type: none"><li>1. Cebrián, A. M., Domínguez-Vázquez, A., Fajardo, P., and Ahedo, E. “ Macroscopic plasma analysis from 1D-radial kinetic results of a Hall thruster discharge”.. <i>Plasma Sources Science and Technology</i>, (In press). 2021. DOI: 10.1088/1361-6595/ac325e</li><li>2. Domínguez-Vázquez, A., , Cichocki, F., Merino, M., Fajardo, P., and Ahedo, E. “On heavy particle-wall interaction in axisymmetric plasma discharge plume”. <i>Plasma Sources Science and Technology</i>, 30(8), 085004. 2021. DOI: 10.1088/1361-6595/ac1715</li><li>3. Cichocki, F., Domínguez-Vázquez, A., Merino, M., Fajardo, P., and Ahedo, E. “On heavy particle-wall interaction in axisymmetric plasma discharge plume”. <i>Plasma Sources Science and Technology</i>, 30(8), 085004. 2021. DOI: 10.1088/1361-6595/ac1715</li></ol>	

4. Cichocki, F., Domínguez-Vázquez, A., Merino, M., Fajardo, P., and Ahedo, E. “Three-dimensional neutralizer effects on a Hall-effect thruster near plume”. *Acta Astronautica*, 187, 498–510. 2021.  
DOI: 10.1016/j.actaastro.2021.06.042
5. Güemes, A., Fajardo, P., and Raiola, M. “Experimental Assessment of RANS Models for Wind Load Estimation over Solar-Panel Arrays”. *Applied Sciences*, 11(6), 2496. 2021.  
DOI:10.3390/app11062496
6. Wijnen, M., Navarro-Cavallé, J. and Fajardo, P. “Mechanically amplified milli-Newton thrust balance for direct thrust measurements of electric thrusters for space propulsion”. *IEEE Transactions on Instrumentation and Measurement*, 70. 1–18. 2020.  
DOI:10.1109/TIM.2020.3037305
7. Merino, M., Fajardo, P., Giono, G., Ivchenko, N., Gudmundsson, J. T., Mazouffre, S., Loubère, D. and Dannenmayer, K. “Collisionless electron cooling in a plasma thruster plume: experimental validation of a kinetic model”. *Plasma Sources Science and Technology*, 29 (3), 035029. 2020.  
DOI:10.1088/1361-6595/ab7088
8. López-Núñez, E., Pérez-Quiles, M.J., Fajardo, P., and Hoyas, S. “Effect of the horizontal aspect ratio on thermocapillary convection stability in annular pool with surface heat dissipation”. *International Journal of Heat and Mass Transfer*, 148, 119140, 2020.  
DOI:10.1016/j.ijheatmasstransfer.2019.119140
9. Zhou, J., Pérez-Grande, D., Fajardo, P., and Ahedo, E. “Numerical treatment of a magnetized electron fluid model within an electromagnetic plasma thruster simulation code”. *Plasma Sources Science and Technology*, 28 (11), 115004, 2019.  
DOI: 10.1088/1361-6595/ab4bd3
10. Domínguez-Vázquez, A., Taccogna, F., Fajardo, P., and Ahedo, E. “Parametric study of the radial plasma-wall interaction in a Hall thruster”. *Journal of Physics D: Applied Physics*, 52 (47), 474003, 2019.  
DOI: 10.1088/1361-6463/ab3c7b
11. Juste, G. L., Sánchez de León, L., López-Núñez, E., and Fajardo, P. “Sidewall effects on heat transfer in narrow backward facing step in transitional regime”. *Numerical Heat Transfer: Applications*, 76 (8), 628-647, 2019.  
DOI: 10.1080/10407782.2019.1644930
12. Domínguez-Vázquez, A., Cichocki, F., Merino, M., Fajardo, P., and Ahedo, E. “Axisymmetric plasma plume characterization with 2D and 3D particle codes”. *Plasma Sources Science and Technology*, 27(10), 104009, 2018.
13. Juste, G. L., and Fajardo, P. “Influence of flow tree-dimensionality on the heat transfer of a narrow channel backward facing step flows”. *International Journal of Thermal Sciences*, 132, 234-248, 2018.
14. Navarro-Cavallé, J., Wijnen, M., Fajardo, P., and Ahedo, E. “Experimental characterization of a 1 kW helicon plasma thruster”. *Vacuum*, 149, 69-73, 2018.
15. Hoyas, S., Ianiro, A., and Pérez-Quiles, M. J., and Fajardo, P. “On the onset of instabilities in a Bénard-Marangoni problem in an annular domain with temperature gradient”. *Thermal Science*, 20 (6), S1-S13, 2017.
16. Pérez-Grande, D., Gonzalez-Martinez, O., Fajardo, P., Ahedo, E. “Analysis of the numerical diffusion in anisotropic mediums: Benchmarks for magnetic field aligned meshes in space propulsion simulations”. *Applied Sciences*, 6 (11), 354, 2016.

17. Juste, G.L., Fajardo, P., and Guijarro, A. "Assessment of secondary bubble formation on a backward-facing step geometry". *Physics of Fluids*, 28 (7), 074106, 2016.
18. Hoyas, S., Fajardo, P., and Pérez-Quiles, M. J. "Influence of geometrical parameters on the linear stability of a Bénard-Marangoni problem". *Physical Review E*, 93 (4), 043105, 2016.
19. Juste, G.L., and Fajardo, P. "Assessment of experimental optical techniques for characterizing heat transfer using numerical simulations". *Engineering Applications of Computational Fluid Mechanics*, 2015.
20. Hoyas, S., Fajardo, P., Gil, A., and Perez-Quiles, M. J. "Analysis of bifurcations in a Bénard-Marangoni problem: Gravitational effects". *International Journal of Heat and Mass Transfer*, 73, 33-41, 2014.
21. Galindo, J., Tiseira, A., Fajardo, P., and García-Cuevas, L. M. "Development and validation of a radial variable geometry turbine model for transient pulsating flow applications". *Energy Conversion and Management*, 85, 190-203, 2014.
22. Benajes, J. and Galindo, J. and Fajardo, P. and Navarro, R. "Development of a segregated compressible flow solver for turbomachinery simulations"- *Journal of Applied Fluid Mechanics*, 7 (4), 673-682, 2014.
23. Galindo, J., Hoyas, S., Fajardo, P., and Navarro, R. "Set-up analysis and optimization of CFD simulations for radial turbines". *Engineering Applications of Computational Fluid Mechanics*, 7 (4), 441-460, 2013.
24. Hoyas, S., Gil, A., Fajardo, P., and Pérez-Quiles, M. J. "Codimension-three bifurcations in a Bénard-Marangoni problem". *Physical Review E*, 88(1), 015001, 2013.
25. Galindo, J., Tiseira, A., Fajardo, P., and Navarro, R. "Analysis of the influence of different real flow effects on computational fluid dynamics boundary conditions based on the method of characteristics". *Mathematical and Computer Modelling*, 57(7-8), 1957-1964, 2013.
26. Galindo, J., Fajardo, P., Navarro, R., and García-Cuevas, L. M. "Characterization of a radial turbocharger turbine in pulsating flow by means of CFD and its application to engine modeling". *Applied Energy*, 103, 116-127, 2013.
27. Torregrosa, A.J., Fajardo, P., Gil, A., and Navarro, R. "Development of non-reflecting boundary condition for application in 3D computational fluid dynamics codes". *Engineering Applications of Computational Fluid Mechanics*, 6 (3), 447-460, 2012.
28. Serrano, J. R., Arnau, F. J., Fajardo, P., Belmonte, M. R., and Vidal, F. "Contribution to the modeling and understanding of cold pulsating flow influence in the efficiency of small radial turbines for turbochargers". *Journal of Engineering for Gas Turbines and Power*, 134(10), 102701, 2012.
29. Payri, F., Serrano, J. R., Fajardo, P., Reyes-Belmonte, M. A., and Gozalbo-Belles, R. "A physically based methodology to extrapolate performance maps of radial turbines". *Energy Conversion and Management*, 55, 149-163, 2012.
30. Galindo, J., Tiseira, A., Fajardo, P., and Navarro, R. "Coupling methodology of 1D finite difference and 3D finite volume CFD codes based on the Method of Characteristics". *Mathematical and Computer Modelling*, 54(7), 1738-1746, 2011.
31. Margot, X., Hoyas, S., Fajardo, P., and Patouna, S. "CFD study of needle motion influence on the spray conditions of single-hole injectors". *Atomization and Sprays*, 21(1), 2011.

32. Tancrez, M., Galindo, J., Guardiola, C., Fajardo, P., and Varnier, O. "Turbine adapted maps for turbocharger engine matching". *Experimental thermal and fluid science*, 35(1), 146-153, 2011.
33. Margot, X., Hoyas, S., Fajardo, P., and Patouna, S. "A moving mesh generation strategy for solving an injector internal flow problem". *Mathematical and Computer Modelling*, 52(7), 1143-1150, 2010.
34. Fajardo, P., Barahona, S., and Sanz-Andres, A. "Some Results of the Educational Experiment APIS (Cervantes Mission on Board ISS)". *Microgravity Science and Technology*, 21(3), 247-255, 2009.

RESEARCH  
PROJECTS

- *Consortium for Hall Effect Orbital Propulsion System Phase 2 (CHEOPS MEDIUM)*. H2020 Program (European Commission). PI: E. Ahedo Grant number: 101004366, (Mar 2021 - Aug 2024). 270 k€
- *Consortium for Hall Effect Orbital Propulsion System Phase 2 (CHEOPS LOW)*. H2020 Program (European Commission). PI: P. Fajardo Grant number: 101004331 (Feb. 2021 - Jan. 2024). 170 k€
- *Advanced Space Propulsion for Innovative Realization of space Exploration (ASPIRE)*. H2020 Program (European Commission). PI: E. Ahedo Grant number: 101004366, (Jan. 2021 - Jun. 2023). 250 k€
- *Métodos avanzados de caracterización experimental de propulsores espaciales y su aplicación a la emisión electrostática en propulsores basados en fuentes de Líquidos Iónicos..* Madrid Region. PI: P. Fajardo. Grant number: IND2020/TIC-17316, (Jan. 2021 - Jan 2024). 90 k€
- *Revolutionizing advanced electrodeless plasma thrusters for space transportation (ZARATHUSTRA)*. European Research Council, ERC-2020-STG,. PI: M. Merino. Grant number: 950466, (Jan. 2021 - Dec. 2025). 1.5 M€
- *Propulsión Espacial Eléctrica para Satélites en Órbita Terrestre (ESPEOS)*. AGENCIA ESTATAL DE INVESTIGACION (AEI). PI: P. Fajardo and M. Merino. Grant number: PID2019-108034RB-I00. (Jan. 2020 - Dec. 2022). 188 k€
- *HelIcon Plasma Thruster for In-space Applications (HIPATIA)*. H2020 Programme - European Commission. PI: P. Fajardo. Grant number: 870542 (Jan. 2020- Dec. 2022). 455 k€
- *Simulación Numérica de la Turbulencia en Propulsión Espacial Eléctrica: Sinergias con Plasmas de Fusión (SIMTURB-CM-UC3M)*. Funded by Madrid Region. PI: P. Fajardo, J.M. Reynolds. (Jan. 2019- Dec. 2020). 60.000 €
- *Resolviendo el transporte anómalo en motores de plasma de efecto Hall mediante técnicas data-driven robustas de análisis modal (MARETERRA-CM-UC3M)*. Funded by Madrid Region. PI: M. Merino, F. Terragni. (Jan. 2019- Dec. 2020). 60.000 €
- *European Direct-Drive Architecture (EDDA)*. H2020 Programme - European Commission. PI: E. Ahedo. Grant number: 870470 (Dec. 2019- Dec. 2021). 100.000 €
- *Improvements in Helicon Antenna Thruster RF-Plasma Discharge Coupling for its Evolution towards Space Application*. Funded by ESA GSTP Program. PI: P. Fajardo. Contract number: RFP ESA RFP/3-15534/18/NL/KML/va, (Nov. 2018 - Apr. 2020). 100.000 €
- *Propulsión por plasma y fusión nuclear: innovando el transporte espacial*. PROMETEO-CM. Funded by Madrid Region. PI: E. Ahedo. Grant number: Y2018/NMT-4750, (2019-2021). 498.900 €

- *Millimeter wave Array at Room Temperature for INstruments in Leo Altitude. MARTINLARA-CM.* Funded by Madrid Region. PI: E. Ahedo. Grant number: P2018/NMT-4333, (2019-2022). 165.589 €
- *Collaborative network for the development of educational nanosatellites in Europe.* Funded by EUROPEAN COMMISSION RESEARCH EXECUTIVE AGENCY. PI: M. Merino. Grant number: SOE2/P1/F0684, (Apr. 2018 - Sept. 2020). 232.875,01 €
- *Electromagnetic Thrusters for Space Exploration (PE3).* Funded by Spanish Ministry of Economy and Competitiveness. PI: P. Fajardo, E. Ahedo. Grant number: ESP2016-75887-P (2017-2019). 228.400 €
- *MagnetIc NOzzle thruster with elecTron cyclOtron Resonance (MINOTOR).* H2020 Programme - European Commission. PI: M. Merino. Grant number: 730028 (Jan. 2017- Dec. 2019). 310.000 €
- *Consortium for Hall Effect Orbital Propulsion System (CHEOPS).* H2020 Programme - European Commission. PI: E. Ahedo. Grant number: 730135 (Jan. 2017- Jun. 2020). 360.000 €
- *Model and experimental validation of spacecraft thruster interactions for electric propulsion thrusters plume.* Funded by European Space Agency (Contract number: 4000116180/15/NL/PS). PI: E. Ahedo (03/2016-02/2018). 80.000 €
- *Plasma Space Propulsion: Simulations and Experiments.* Funded by Spanish Ministry of Economy and Competitiveness. PI: E. Ahedo, P. Fajardo. Grant number: ESP2013-41052-P (2014-2016). 242.000 €
- *Cámara de Ensayo de Propulsión Eléctrica.* Funded by Spanish Ministry of Economy and Competitiveness. PI: E. Ahedo, P. Fajardo. Grant number: UNC313-4E-1552 (2013-2015). 547.000 €
- *Low Earth Orbit Security With Enhanced Electric Propulsion (LEOSWEEP).* 7<sup>th</sup> Framework Programme of the European Union, PI: E. Ahedo. Grant number: 607457, (2013-2016) 164.724 €
- *Design Of Compressor Air Inlet Protection For Electrical ECS.* CLEAN SKY JOINT UNDERTAKING (UE). Oct. 2012 -April 2014. PI: V. Macian. 197000 €
- *LES methods for multiphase flow simulations (Metodos LES para la simulacion de chorros multifasicos).* Funded by Spanish Ministry of Science and Innovation. PI: J.M. Desantes (Jan. 2011-Dic. 2014). 179000 €
- *CleanSky CROR FEM-CFD Model for static aeroelastic analysis investigation.* Funded by Airbus Military (from UE programm). 2012.
- *PROYECTO MIURA: Analisis del desarrollo e implementacion de un sistema de guiado para proyectiles no guiados.* Funded by EVERIS AEROESPACIAL Y DEFENSA, S.L.U. (Spanish Government project). May 2013 - Feb. 2014. 40000 €
- *Electric Propulsion Diagnostics for Plasma Thrusters (DTK).* Funded by European Space Agency. Mar. 2021-Sep. 2022. PI: J. Navarro (96 k€).
- *Cátedra UC3M-ISDEFE ESPACIO.* Funded by INGENIERÍA DE SISTEMAS PARA LA DEFENSA DE ESPAÑA, S.A, S.M.E, M.P. 2019-2023. PI: P. Fajardo (220 k€).
- *Apoyo a tareas de testeo de componentes del subsistema (RIS3-CAM).* Funded by IENAI Space, Sep. 2020 - Apr. 2021. PI: P. Fajardo (3 k€).

SELECTED  
RESEARCH  
CONTRACTS

- *Interlaboratory Test Activities in ESA and UC3M*. Funded by SENER Aeroespacial, S.A. May. 2019 - Nov. 2019. PI: J. Navarro (10 k€).
- *Faraday Probe for Helicon Plasma Thruster*. Funded by SENER, INGENIERIA Y SISTEMAS, S.A. Jul. 2018 - Oct. 2018. PI: J. Navarro (7.5 k€).
- *Convenio de colaboración para la creación de la cátedra UC3M- SENER Aeroespacial*. Funded by SENER, INGENIERIA Y SISTEMAS, S.A. Mar. 2018 - Mar. 2020. PI: E. Ahedo (60 k€).
- *Experimental campaign for the characterization and optimization of the HPT-05M Helicon Plasma Thruster prototype*. Funded by SENER Ingeniería y Sistemas. 2017. PI: J. Navarro (15 k€).
- *TOOLS*. Funded by AIRBUS OPERATIONS, S.L. Oct. 2017- Jun. 2019. PI: A. Ianiro, S. Discetti (81.5 k€).
- *CHARACTERISATION TESTS ON HELICON PLASMA THRUSTER*. Funded by AIRBUS SAS. Nov. 2016 - Apr. 2017. PI: P. Fajardo. (15 k€).
- *Development of an advanced axisymmetric model of the full plasma discharge in the Helicon Plasma Thruster*. Funded by AIRBUS SAS. Sep. 2016 - Aug. 2019. PI: E. Ahedo. (90 k€).
- *DEGASS-Desarrollo de sistemas embarcados de generación de gas inerte para aviones de tamaño medio y medio recorrido*. Funded by COMPAÑIA ESPAÑOLA DE SISTEMAS AERONAUTICOS S.A. Sep. 2016 - Mar. 2017. PI: P. Fajardo. (35 k€).
- *Convenio específico entre Ingeniería de Sistemas para la Defensa de España y la Universidad Carlos III de Madrid para el desarrollo de Trabajos de Prospectiva Tecnológica en el área Aeroespacial*. Funded by INGENIERIA DE SISTEMAS PARA LA DEFENSA DE ESPAÑA, S.A. (ISDEFE). Mar. 2016 - Mar. 2018. PI: P. Fajardo. (80 k€).
- *Campaña experimental de caracterización y optimización del prototipo HPT-05 (Experimental Campaign of HPT-05 prototype)*. Funded by SENER, INGENIERIA Y SISTEMAS, S.A. Jun. 2016 - Aug. 2016. PI: P. Fajardo. (13.5 k€).
- *Design and Manufacturing of a Langmuir Probe for the use in RF Generated Plasmas*. Funded by SENER, INGENIERIA Y SISTEMAS, S.A. (project with ESA). Dec. 2015 - April 2016. PI: M. Merino. (12.5 k€).
- *10kW Hall-Effect Thruster Optimized for Space Transportation*. Funded by SNECMA (project with ESA). March 2014 - July 2014. PI: E. Ahedo. (15 k€).
- *Advisor in CFD projects*. Funded by COMET Ingeniería. Jun. 2014-May. 2017. PI: P.Fajardo. (15 k€).
- *Apoyo en la obtención de las características aerodinámicas de un seguidor solar*. Several projects on this topic both numerical and experimental. Funded by ATOS SPAIN, S.A.U and PV Hardware. Jul. 2013-Jul. 2014. PI: P.Fajardo. (20.4 k€).
- *Development Of A Methodology For Centrifugal Compressor Modelling By Means Of STARCCM+*. Funded by POWERTECH ENGINEERING S.R.L. Nov 2012 - July 2013. PI: F. Payri. (109.5 k€).
- *Aerodynamic characterization of a guided bomb (análisis de las características aerodinámicas y de estabilidad de un nuevo modelo de bomba guiada)*. Funded by Embention s.l., 2010-2011. PI: F. Payri. (40 k€).
- *Proyecto de viabilidad para la fabricación de vehículos aéreos híbridos para el transporte de mercancías*. Funded by NEW TRANSPORT CONCEPT PROYECT, S.L., 2009. PI: F. Payri. (17.4 k€).

- *Projet De Recherche Sur Le Pompage Du Compresseur (Essais Metier)*. Funded by PEUGEOT CITROEN AUTOMOBILES, S.A., Sep 2009-Jan 2010. PI: F. Payri. (120 k€).
- *Pulsating Flow in Turbochargers*. Funded by Peugeot Citroen Automobiles (PSA), 2009. PI: F. Payri. (65 k€).

REFEREED  
PROCEEDINGS

1. Zhou, J., Taccogna, F., Fajardo, P., and Ahedo, E. "Performance analysis of alternative propellants for a helicon plasma thruster". Space Propulsion 2021, Estoril, Portugal, March 17-19, 2021. Conf. Proceedings, paper SP2020-191, available at <http://ep2.uc3m.es/> (2021)
2. Ruiz, M., Gomez, V., Fajardo, P., Navarro, J., Albertoni, R., Dickeli, G., ... and Hildebrand, N. "The HIPATIA project's initial development stages: setting the basis to bring the Helicon Plasma Thruster and its associated technologies to intermediate-high TRLs". Space Propulsion 2021, Estoril, Portugal, March 17-19, 2021. Conf. Proceedings, paper SP2020-421, available at <http://ep2.uc3m.es/> (2021)
3. Perrotín, T., Domínguez-Vázquez, A., Navarro-Cavallé, J., Fajardo, P., and Ahedo, E. "DESIGN AND PRELIMINARY STUDY OF A 200W CYLINDRICAL HALL THRUSTER". Space Propulsion 2021, Estoril, Portugal, March 17-19, 2021. Conf. Proceedings, paper SP2020-090, available at <http://ep2.uc3m.es/> (2021)
4. Perales-Díaz, J., Domínguez-Vázquez, A., Fajardo, P., Ahedo, E., Faraji, F. Reza, M., and Andreussi, T. "CHARACTERIZATION OF A 5kW-CLASS HALL THRUSTER VIA 2D HYBRID SIMULATIONS". Space Propulsion 2021, Estoril, Portugal, March 17-19, 2021. Conf. Proceedings, paper SP2020-391, available at <http://ep2.uc3m.es/> (2021)
5. Marín-Cebrián, A., Domínguez-Vázquez, A., Fajardo, P., and Ahedo, E. "RADIAL PARTICLE-IN-CELL SIMULATIONS OF A HALL THRUSTER DISCHARGE WITH DIFFERENT ANOMALOUS TRANSPORT MODELS". Space Propulsion 2021, Estoril, Portugal, March 17-19, 2021. Conf. Proceedings, paper SP2020-00306, available at <http://ep2.uc3m.es/> (2021)
6. Ruiz, M., Gomez, V., Fajardo, P., Navarro, J., Albertoni, R., Dickeli, G., ... and Hildebrand, N. "HIPATIA: A project for the development of the Helicon Plasma Thruster and its associated technologies to intermediate-high TRLs". 71<sup>st</sup> International Astronautical Congress (IAC)–The CyberSpace Edition. 2020. International Astronautical Federation.
7. J. M. Muñoz-Tejada, D. Morón, M. K. Verma, P. Fajardo, C. Verhoeven. "ENVIRONMENTAL ANALYSIS OF NANOROVERS IN A SWARM FOR LUNAR SCIENTIFIC MISSIONS". 70<sup>th</sup> International Astronautical Congress. Washington D.C., United States. October 21<sup>st</sup>, 2019. International Astronautical Federation.
8. Ahedo, E., Fajardo, P., Merino, M., Navarro-Cavallé, J., Sánchez-Villar, A., Wijnen, M., and Zhou, J. "Helicon and ECR plasma sources for space propulsion: simulation and testing". In 2019 International Conference on Electromagnetics in Advanced Applications (ICEAA) (pp. 0788-0793). IEEE. DOI: 10.1109/ICEAA.2019.8879300
9. J. Zhou, P. Jiménez, M. Merino, P. Fajardo and E. Ahedo. "Numerical Simulations of the Plasma Discharge in a Helicon Plasma Thruster", 36<sup>th</sup> International Electric Propulsion Conference. Vienna, Austria. September 15-20<sup>th</sup>, 2019. Conf. Proceedings paper IEPC-2019-330, Electric Rocket Propulsion Soc., <https://erps.spacegrant.org/> (2019)

10. A. Marín-Cebrián, A. Domínguez-Vázquez, P. Fajardo and E. Ahedo. “Simulation of radial electron dynamics in a Hall effect thruster”, 36<sup>th</sup> International Electric Propulsion Conference. Vienna, Austria. September 15-20<sup>th</sup>, 2019. Conf. Proceedings paper IEPC-2019-593, Electric Rocket Propulsion Soc., <https://erps.spacegrant.org/> (2019)
11. F. Cichocki, A. Domínguez-Vázquez, M. Merino, P. Fajardo and E. Ahedo. “3D simulations of a magnetized Hall Effect thruster plume”, 36<sup>th</sup> International Electric Propulsion Conference. Vienna, Austria. September 15-20<sup>th</sup>, 2019. Conf. Proceedings paper IEPC-2019-460, Electric Rocket Propulsion Soc., <https://erps.spacegrant.org/> (2019)
12. A. Domínguez-Vázquez, J. Zhou, P. Fajardo and E. Ahedo. “Analysis of the plasma discharge in a Hall thruster via a hybrid 2D code”, 36<sup>th</sup> International Electric Propulsion Conference. Vienna, Austria. September 15-20<sup>th</sup>, 2019. Conf. Proceedings paper IEPC-2019-579, Electric Rocket Propulsion Soc., <https://erps.spacegrant.org/> (2019)
13. V. Gómez, A. Giménez, M. Ruiz, J. Navarro-Cavallé, P. Fajardo, M. Wijnen, E. Ahedo. “RF Power - Plasma Coupling Experimental Results in a Helicon Plasma Thruster Prototype”, 36<sup>th</sup> International Electric Propulsion Conference. Vienna, Austria. September 15-20<sup>th</sup>, 2019. Conf. Proceedings paper IEPC-2019-365, Electric Rocket Propulsion Soc., <https://erps.spacegrant.org/> (2019)
14. M. Wijnen, J. Navarro-Cavallé, P. Fajardo, E. Ahedo. “Mechanically amplified milli-Newton thrust balance for helicon plasma thrusters”, 36<sup>th</sup> International Electric Propulsion Conference. Vienna, Austria. September 15-20<sup>th</sup>, 2019. Conf. Proceedings paper IEPC-2019-595, Electric Rocket Propulsion Soc., <https://erps.spacegrant.org/> (2019)
15. J. Navarro-Cavallé, M. Wijnen, P. Fajardo, E. Ahedo. “An experimental revisit of plasma phenomena on Helicon Plasma Thrusters”, 36<sup>th</sup> International Electric Propulsion Conference. Vienna, Austria. September 15-20<sup>th</sup>, 2019. Conf. Proceedings paper IEPC-2019-903, Electric Rocket Propulsion Soc., <https://erps.spacegrant.org/> (2019)
16. J. Navarro-Cavallé, M. Wijnen, P. Fajardo, E. Ahedo, V. Gómez, A. Giménez, M. Ruiz. “Development and Characterization of the Helicon Plasma Thruster Prototype HPT05M”, 36<sup>th</sup> International Electric Propulsion Conference. Vienna, Austria. September 15-20<sup>th</sup>, 2019. Conf. Proceedings paper IEPC-2019-596, Electric Rocket Propulsion Soc., <https://erps.spacegrant.org/> (2019)
17. M. Wijnen, J. Navarro-Cavallé, Y. Babou, P. Fajardo, “Webcam based in-vacuum tomography of plasma thruster jets”, 15<sup>th</sup> International Conference on Fluid Control, Measurements and Visualization. Napples, Italy. May, 27-30<sup>th</sup>, 2019. Conf. Proceedings, paper: 349 (2019)
18. E. López-Núñez, P. Fajardo, M. J. Pérez-Quiés, S. Hoyas, “Linear Stability of a Bénard-Marangoni cylindrical problem: A review”, 15<sup>th</sup> International Conference on Fluid Control, Measurements and Visualization. Napples, Italy. May, 27-30<sup>th</sup>, 2019. Conf. Proceedings, paper: 337 (2019).
19. M. Wijnen, Y. Babou, J. Navarro, P. Fajardo, E. Ahedo, “Characterization of a helicon plasma thruster by means of low-resolution optical emission spectrometry”, Space Propulsion 2018, Sevilla, May 14-18, 2018, Conf. Proceedings, paper SP2018-164, available at <http://ep2.uc3m.es/> (2018)
20. A. Domínguez-Vázquez, F. Taccogna, P. Fajardo, E. Ahedo, “Influence of relevant parameters on the radial PIC simulation of a Hall effect thruster discharge”, Space Propulsion 2018, Sevilla, May 14-18, 2018, Conf. Proceedings, paper SP2018-288, available at <http://ep2.uc3m.es/> (2018)

21. J. Navarro-Cavallé, M. Wijnen, P. Fajardo, E. Ahedo, V. Gómez, Á. Giménez, M. Ruiz, “Test campaign results of a helicon plasma thruster (HPT-05M) prototype and its future development plan”, Space Propulsion 2018, Sevilla, May 14-18, 2018, Conf. Proceedings, paper SP2018-290, available at <http://ep2.uc3m.es/> (2018)
22. J. Zhou, A. Domínguez, D. Pérez-Grande, P. Fajardo, E. Ahedo, “An Axisymmetric Hybrid Model for the Plasma Transport in a Helicon Plasma Thruster”, Space Propulsion 2018, Sevilla, May 14-18, 2018, Conf. Proceedings, paper SP2018-308, available at <http://ep2.uc3m.es/> (2018)
23. J. Navarro-Cavallé, M. Wijnen, P. Fajardo, M. Merino, E. Ahedo, M. Ruiz, and V. Gómez, “Experimental performances of a 1 kW HPT”. Iberian Vacuum Conference, RIVA-X, Bilbao, October 4-6, 2017.
24. Pérez-Grande, D., Zhou, J., Domínguez, A., Fajardo, P., and Ahedo, E., “Development updates for a two-dimensional axisymmetric hybrid code for Plasma Thruster discharges”, 35<sup>th</sup> Intern. Electric Propulsion Conf., Georgia Inst. Technology, USA October 8-12, 2017, paper IEPC-2017-201, Electric Rocket Propulsion Soc., <https://erps.spacegrant.org/> (2017)
25. Domínguez, A., Cichocki, F., Merino, M., Fajardo, P., and Ahedo, E., “2D and 3D hybrid PIC-fluid modeling of electric thruster plumes”, 35<sup>th</sup> Intern. Electric Propulsion Conf., Georgia Inst. Technology, USA October 8-12, 2017, paper IEPC-2017-209, Electric Rocket Propulsion Soc., <https://erps.spacegrant.org/> (2017)
26. L. Popelier, C. Théroude, D. Loubère, K. Dannenmayer, P. Sarrailh, S. Hess, M. Merino, P. Fajardo, E. Ahedo and 4 more, “Model and Experimental validation of spacecraft-thruster Interactions for electric propulsion thrusters plumes”, 35<sup>th</sup> Intern. Electric Propulsion Conf., Georgia Inst. Technology, USA October 8-12, 2017, paper IEPC-2017-357, Electric Rocket Propulsion Soc., <https://erps.spacegrant.org/> (2017)
27. J. Navarro-Cavallé, M. Wijnen, P. Fajardo, M. Merino, E. Ahedo, M. Ruiz, and V. Gómez, “Experimental performances of a 1 kW HPT by means of plasma diagnostics”, 35<sup>th</sup> Intern. Electric Propulsion Conf., Georgia Inst. Technology, USA October 8-12, 2017, paper IEPC-2017-447, Electric Rocket Propulsion Soc., <https://erps.spacegrant.org/> (2017)
28. Merino, M., Proux, A., Fajardo, P., and Ahedo, E., “Collisionless electron cooling in unmagnetized plasma thruster plumes”, 52<sup>th</sup> AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit, No. AIAA 2016-5037, AIAA, Salt Lake City, UT, 2016.
29. D. Pérez-Grande, P. Fajardo, E. Ahedo. “Benchmarks for Magnetically Aligned Meshes in Electromagnetic Plasma Thruster Simulations”. IEPC, Kobe, Japan, 2015.
30. D. Pérez-Grande, P. Fajardo, E. Ahedo. “Evaluation of Erosion Reduction Mechanisms in Hall Effect Thrusters”. IEPC, Kobe, Japan, 2015.
31. P. Fajardo. “Research Activities in Aerospace at UC3M”. Congreso de Ingeniería Aeronáutica Invited Lecture. Madrid, 2014.
32. M. Lázaro, C.F. Casanova, P. Fajardo and P. Martín. “Recursive Computation of Complex Frequencies of Vibrating Non-Viscous Damped Systems”. Proceedings of the Ninth International Conference on Engineering Computational Technology. Civil-Comp Press, Stirlingshire, United Kingdom, Vol. 105, paper 35 (16pp), 2014.

33. S. Hoyas, A. Gil, P. Fajardo, Dung Khuong-Anh, and Frederic Ravet. "Evaluation and Validation of ELSA Model in Diesel Sprays: 3D Cavitating Nozzles Case" *ICLASS 2012, 12<sup>th</sup> Triennial International Conference on Liquid Atomization and Spray Systems*. 2012.
34. Roibas-Millan, E., Chimeno-Manguan, M., Martínez-Calvo, B., López-Díez, J., Fajardo, P., Fernandez, M.J., Simon, F. Criteria for mathematical model selection for satellite vibro-acoustic analysis depending on frequency range. European Space Agency, (Special Publication) *ESA SP, 691*, 2012. ISBN 978-92-9092-255-1
35. Martínez-Calvo, B., Roibás-Millán, E., Chimeno Manguan, M., Fajardo, P., Riobóo, J. L., Simon, F., and López Díez, J. (2012). "Development of FEM/BEM and SEA models from experimental results for structural elements with attached equipment". European Space Agency, (Special Publication) *ESA SP, 691*, 2012. ISBN 978-92-9092-255-1
36. Chimeno Manguan, M., Martínez-Calvo, B., Roibás-Millán, E., Fajardo, P., Simon, F., and López Díez, J. "Comparison of numerical models for vibro-acoustic analysis of structural panels in low modal density range engaging air layers". European Space Agency, (Special Publication) *ESA SP, 691*, 2012. ISBN 978-92-9092-255-1
37. Serrano, J. R., Climent, H., Fajardo, P., Reyes-Belmonte, M. A., and Vidal, F. "Contribution to the Understanding of Cold Pulsating Flow Influence in the Efficiency of Small Radial Turbines for Turbochargers". In *ASME Turbo Expo 2012: Turbine Technical Conference and Exposition*, 571-580. June 2012. American Society of Mechanical Engineers.
38. Margot, X., García, A., Fajardo, P., Patouna, S. "Analysis Of The Cavitating Flow In Real Size Diesel Injectors With Fixed And Moving Needle Lift Simulations". *V European Conference on Computational Fluid Dynamics (ECCOMAS)*. 2010. ISBN 978-989-96778-1-4.
39. Tiseira, A., Valencia, O., Fajardo, P., Chimeno, M., Hernández, L., Cid, E., López-Díez, J. "The use of new configuration airship for the desaturaton of the sky". *8th International Airship Convention*. Bedford, England. 29 September to 3 October 2010. ISBN 0-9528578-7-1.

OTHER  
CONFERENCES &  
SEMINARS

1. Perrotín, T., Fajardo, P., and Ahedo, E. "Development of a low-power cylindrical Hall thruster", *5<sup>th</sup> International Conference on Micropropulsion and CubeSats*, Virtual Edition. 8-10<sup>th</sup> September, 2018
2. P. Fajardo et al. "Avances en propulsión espacial por plasma en la UC3M", Congreso de Ingeniería Espacial. Instituto de Ingeniería de España. Oct. 2020.
3. P. Fajardo. "Promoción de las carreras STEM y la ingeniería aeronáutica", Colegio Oficial de Ingenieros Aeronáuticos de España, December 19<sup>th</sup>, 2019.
4. A. Domínguez, J. Zhou, Fajardo, E. Ahedo. "Simulation of Hall thruster performances with HYPHEN", EPIC Workshop 2019, ESA-ESTEC, Noordwijk, The Netherlands, October 21-25<sup>th</sup> 2019
5. F. Cichocki, A. Domínguez-Vázquez, M. Merino, P. Fajardo, and E. Ahedo. "Simulation of Hall thruster 3D plumes with EP2PLUS", EPIC Workshop 2019, ESA-ESTEC, Noordwijk, The Netherlands, October 21-25<sup>th</sup> 2019
6. J. Navarro-Cavallé, M. Wijnen, V. Gomez, P. Fajardo, E. Ahedo. "Experimental activities at the Electric propulsion and Plasmas Team (EP2-UC3M): an example of an intense testing campaign on the Helicon Plasma Thruster (HPT05M)", EPIC Workshop 2019, ESA-ESTEC, Noordwijk, The Netherlands, October 21-25<sup>th</sup> 2019

7. M. Merino et al. “Synergies between space plasma propulsion and magnetic confinement plasma fusion”, XXXVII Reunión bienial de la Real Sociedad Española de Física. Zaragoza, July, 15-19<sup>th</sup>, 2019
8. J. Navarro-Cavallé, M. Wijnen, P. Fajardo, E. Ahedo, V. Gómez, A. Gimenez, M. Ruiz, “Development and Evolution of the Helicon Plasma Thruster Prototype (HPT) for in-Space Propulsion”, 8<sup>th</sup> European Conference for Aeronautics and Space Sciences. Madrid. July, 1-4<sup>th</sup>, 2019
9. A. Domínguez, J. Zhou, A. Sánchez-Villar, M. Merino, Fajardo, E. Ahedo, “HYPHEN: A simulation platform for space plasma thrusters”, 8<sup>th</sup> European Conference for Aeronautics and Space Sciences. Madrid. July, 1-4<sup>th</sup>, 2019
10. A. Domínguez, P. Fajardo, E. Ahedo, F. Taccogna. “Non-Maxwellian electron VDF features in a Hall thruster chamber”, ExB Workshop. Princeton, November, 1-2<sup>nd</sup>, 2018
11. A. Domínguez, D. Pérez-Grande, A. Sánchez-Villar, B. Tian, J. Zhou, P. Fajardo, M. Merino, E. Ahedo. “HYPHEN: A multi-thruster simulation platform”, EPIC Workshop. London, October 15-17<sup>th</sup>, 2018
12. A. Domínguez, P. Fajardo, E. Ahedo, F. Taccogna. “Non-Maxwellian electron VDF features in a Hall thruster chamber”, ExB Workshop, Princeton, November 1-2, 2018
13. M. Merino, F. Cichocki, E. Ahedo, J.M. Catalán, A. Domínguez-Vázquez, P. Fajardo. “Electron modeling in hybrid plasma thruster plume simulations”, SPINE meeting, ESA, October, 25-26<sup>th</sup>, 2018
14. M. Merino, J. Navarro, F. Cichocki, A. Domínguez-Vázquez, M. Wijnen, P. Fajardo, E. Ahedo. “Micro-Propulsion plasma plume measurement and simulation”, 2<sup>nd</sup> International Conference on Micropropulsion and CubeSats, Singapore, January 8-12<sup>th</sup>, 2018
15. P. Fajardo, M. Merino, E. Ahedo. “An advanced simulation code for Hall effect thrusters”. EPIC Workshop. Madrid, October 2017
16. Merino, M., Ahedo, E., and Fajardo, P., “Development of physical models of electron cooling in collisionless plasma thruster plumes”, 22<sup>nd</sup> SPINE Meeting and Workshop, SPIS/SPINE Community, ESA, 2016.
17. Domínguez, A., Cichocki, F., Pérez, D., Merino, M., Fajardo, P., and Ahedo, E., “Hybrid PIC-fluid simulation of plasma thrusters and their plumes”, VKI Lecture Series: Electric Propulsion Systems: from recent research developments to industrial space applications, No. STO-AVT-263, Von Karman Institute, Von Karman Institute, Belgium, 2016.
18. Cichocki, F., Domínguez, A., Pérez, D., Merino, M., Ahedo, E., and Fajardo, P., “Hybrid particle codes for electric propulsion”, 14<sup>th</sup> Spacecraft Charging Technology Conference, 2016.
19. Merino, M., Fajardo, P., Navarro, J., Chen, X., Babou, Y., and Ahedo, E., “Characteristics and capabilities of the new EP2 plasma propulsion laboratory”, Space Propulsion Conference 2016, 2016.
20. Domínguez, A., Pérez, D., Fajardo, P., and Ahedo, E., “Development update on NOMADS: A versatile, multi-thruster plasma discharge simulation code”, Space Propulsion Conference 2016, 2016.
21. P. Fajardo. “Research Activities in Aerospace at UC3M”. Invited. Madrid, 2014

## REFEREE SERVICE **International journals**

- Applied Energy
- International Journal of Heat and Fluid Flow
- International Journal of Heat and Mass Transfer
- Engineering Applications of Computational Fluid Mechanics
- Applied Thermal Engineering
- Journal of Aerospace Engineering
- Aerospace Science & Technology
- Journal of Mechanical Engineering Science
- Acta Astronautica

## **Research projects**

- Spanish National Evaluation and Foresight Agency (ANEP)

## **Academic Programs**

- Catalan University Quality Assurance Agency (AQU)

STUDENT  
ADVISING - PHD  
LEVEL

- **Davide Poli**. Universidad Carlos III de Madrid. *2D Fluid modeling of HET*. Co-supervised with E. Ahedo. Expected graduation 2024.
- **David Villegas**. Universidad Carlos III de Madrid. *Micro-propulsión espacial escalable basada en emisión de líquidos iónicos*. Co-supervised with S. Correyero. Expected graduation 2024.
- **Tatiana Perrotin**. Universidad Carlos III de Madrid. *Design, simulation, and testing of a low-power Hall effect thruster*. Co-supervised with E. Ahedo. Expected graduation 2023.
- **Victor Gómez**. Universidad Carlos III de Madrid. *Improvements in Helicon Antenna Thruster RF-Plasma Discharge Coupling for its Evolution towards Space Applications*. Co-supervised with E. Ahedo. Expected graduation 2022.
- **Mick Wijnen**. Universidad Carlos III de Madrid. *Experimental Characterization of Electric Propulsion Technologies*. Co-supervised with J. Navarro. Expected graduation Q4 2021.
- **Jiewei Zhou**. Universidad Carlos III de Madrid. *Modeling and simulation of the plasma discharge in a radiofrequency thruster*. Co-supervised with E. Ahedo. April 2021.
- **Adrián Domínguez Vázquez**. Universidad Carlos III de Madrid. *Axisymmetric simulation codes for Hall effect thrusters and plasma plumes*. Co-supervised with E. Ahedo. May 2019.
- **Daniel Perez-Grande**. Universidad Carlos III de Madrid. *Fluid modeling and simulation of the electron population in Hall Effect Thrusters with complex magnetic topologies*. Co-supervised with E. Ahedo. June 2018.

STUDENT  
ADVISING - BSC &  
MSC LEVEL

- 12 Bachelor thesis at UC3M. 2013-2021.
- 11 Master thesis at UC3M. 2013-2021.
- 14 Final Year Projects in the Aeronautical Engineering (5 years degree) at Universidad Politécnica de Valencia. 2008-2013.

TEACHING  
EXPERIENCE

**Universidad Carlos III de Madrid, Leganés, Spain**

- Aerospace Propulsion. BSc Aerospace Eng. (3rd year). Winter semester 2013-2014.
- Helicopters and other aircrafts. BSc Aerospace Eng. (4th year). Fall semester 2013-2014.
- Introduction to Flight Mechanics. BSc Aerospace Eng. (2nd year). Winter semester 2014-2015.
- Advanced Aircraft Design and Certification I (Finite Element Modeling). MSc Aeronautical Eng. (1st year). Fall semester 2014-2021.
- Advanced Aeroelasticity. MSc Aeronautical Eng. (1st year). Fall semester 2015-2021,
- Aeroelasticity. BSc Aeronautical Eng. (4th year). Fall semester 2014-2017, 2019-2021.
- Stability and Integrity of Aerospace Structures. BSc Aeronautical Eng. (3rd year). Fall semester 2014-2015.
- Aerospace Engineering Design - Structural Dynamics & Helicopter Design. BSc Aeronautical Eng. (4th year). Winter semester 2015-2018.
- Aerospace Engineering Design - Structural Dynamics. BSc Aeronautical Eng. (4th year). Winter semester 2018-2021.

**Universidad Politécnica de Valencia, Valencia, Spain**

- Aeroelasticity. Aeronautical Engineering - 5 years degree. (5th year). 2010-2011, 2011-2012, 2012-2013.
- Aerodynamics and Aeroelasticity. Aeronautical Engineering - 5 years degree. (5th year). 2010-2011, 2011-2012, 2012-2013.
- Aircrafts, Astronautics and Space Engineering. Aeronautical Engineering - 5 years degree. (4th year). 2008-2009, 2009-2010, 2012-2013.
- Space vehicles and missiles. Aeronautical Engineering - 5 years degree. (5th year). 2009-2010.
- Aerodynamics. Aeronautical Engineering - 5 years degree. (3th year). 2008-2009.

**UNAQ - Universidad Aeronáutica en Queretaro, Queretaro, Mexico**

- Procesos de diseño, desarrollo y certificación. MSc. Aerospace Eng. (3rd four-moth period). 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016.
- Turbomachinery. MSc. Aerospace Eng. (4th four-moth period). 2011-2012, 2012-2013, 2013-2014.
- Structural Analysis. MSc. Aerospace Eng. (4th four-moth period). 2011-2012, 2013-2014.

COMPLEMENTARY  
TEACHING  
EXPERIENCE

**Universidad Carlos III de Madrid, Madrid, Spain.**

Introducción to aerospace engineering (6 h/year). Master in Aircraft Systems Integration. 2015-2021.  
Director of Master in Airframe Technology. 2018-2021.

**Universidad Politécnica de Madrid, Madrid, Spain.**

Vibro Acoustics Simulations in Aerospace. ATHENS Programme. March 2011.

TEACHING  
MATERIALS

- *Aerospace Technology*. Aerospace Engineering Degree. Editorial Universitat Politècnica de València, 2013.

- *Transferencia de masa y energía: Ejercicios resueltos*. Aerospace Engineering Degree. Editorial Universitat Politècnica de València, 2014. ISBN: 978-84-9048-207-0.

#### MANAGEMENT

- *Framework agreement ISDEFE-UC3M*. Coordinator. Activities in fields of: Prospective Technology Studies (Aerospace), Teaching, and Research. Signed on 2015.
- *Cátedra Airbus-UC3M para estudios aeroespaciales*. Coordinator, Teaching, and Research. 2016-2020. 120 k€.