

ANTONIO

Avenida de la Universidad 30
28911 Leganés, Madrid, Spain
☎ +34 916248223
✉ antosanc@ing.uc3m.es



SÁNCHEZ TORRES

Education

- PhD in Aerospace Engineering, Universidad Politécnica de Madrid, 2013
 - PhD Thesis: Electrodynamic Tethers For Planetary And De-orbiting Missions.
Supervisor: Prof. Juan Sanmartin
 - Master Thesis: The Radiation Impedance of Electrodynamic Tethers in Jupiter.
Supervisor: Prof. Juan Sanmartin
- M.S. in Fundamental Physics, Universidad Complutense de Madrid, 2007
 - Master Thesis: Gravitational waves in Einstein-Yang-Mills- Λ Black Holes.
Supervisor: Prof. Francisco Chinae
- B.S. in Physics, Theoretical Physics (5-year degree program), Universidad Autónoma de Madrid, 2006.

Work experience

- Juan de la Cierva Researcher Fellow* 2016 –
- Universidad Carlos III de Madrid. Department of Bioengineering and Aerospace Engineering
- Formación de Personal Investigador (PhD FPI fellowship)* 2009 – 2013
- Universidad Politécnica de Madrid. Escuela Técnica Superior de Ingenieros Aeronáuticos
- Visiting researcher* 2012 – 2013
- University of Padova. Centro Interdipartimentale di Studi e Attività Spaziali (CISAS G. Colombo). 4 months. Collaboration with Prof. Enrico Lorenzini
- Project engineer* 2007 – 2008
- GMV Aerospace and Defence. Analysis Mission Department

Teaching experience

- Aerospace Engineering Degree (Universidad Politécnica de Madrid)* 2011 – 2013
- Physics I (1st year)

- Physics II (1st year)
- Classical Mechanics (2nd year)
- Analytical Mechanics (3rd year)

Master/PhD in Aerospace Engineering (Universidad Politécnica de Madrid)

2010 – 2011

- Space Propulsion: Ion and Hall Thrusters; Electrodynamic tethers

Additional experience

Reviewer

2014 –

- Annales Geophysicae
- Acta Astronautica
- Aerospace Science and Technology
- Advances in Space Research
- World Maritime Technology Conference 2015

Patents and Registered Software

1. G. Sanchez-Arriaga, S. B. Khan, A. Sanchez-Torres, J. D. Williams, D. Blash, F. G. Quiros, J. A. Carrasco, R. Rosta, BETsMA (Mission Analysis for Bare Electrodynamic Tethers) Spain M-005377/2014, issued 2014.
2. Antonio Sánchez Torres, Velero electro-solar por pulsos. Patent No. P 201431740, filled 24 November 2014, issued 2 October 2015.
3. Antonio Sánchez Torres, Sistema de propulsión espacial por modificación electrostática. Patent No. P 201431234, filled 19 August 2014, issued 2 July 2015.
4. Antonio Sánchez Torres, Sistema de propulsión espacial por modificación eléctrica pulsante (2015). Patent addition (P 201431234), P 201531029.
5. Antonio Sánchez Torres, Tobera eléctrica pulsante para aumentar el empuje en motores espaciales de plasma. Patent No. P 201630030, filled 15 January 2016.

Peer-reviewed Journal Articles and Books

1. Sanchez-Torres, A., J. R. Sanmartin, J.M Donoso, M. Charro, The radiation impedance of electrodynamic tethers in a polar Jovian orbit, *Advances in Space Research*, 45, 1050-1057, 2010.
2. Sanchez-Torres, A., *Radioisotopes - Applications in Physical Sciences*. Chapter: Radioisotope Power Systems for Space Applications, INTECH, ISBN: 978-953-307-510-5, pp. 457-472, 2011.
3. Sanchez-Torres, A. and Sanmartin J. R., Tether radiation in Juno-type and circular-equatorial Jovian orbits, *Journal of Geophysical Research*, Vol. 116, A12, A12226, 1-12, 2011.
4. Charro, M., Sanmartin J.R., Bombardelli, C., Sanchez-Torres, A., Lorenzini, E.C., Garrett, H.B. and Evans, R.W., A proposed Two-Stage Two-Tether Scientific Mission at Jupiter, *IEEE Transactions on Plasma Science*, vol. 40, 2, 274-280, Feb. 2012.
5. Sanchez-Torres, A., Propulsive force in an electric solar sail, *Contributions to Plasma Physics*, vol. 54, 3, 314-319, 2014.
6. J. Sanmartin, A. Sanchez-Torres, S. B. Khan, G. Sanchez-Arriaga, M. Charro, Optimum sizing of bare-tape tethers for de-orbiting satellites at end of mission, *Advances in Space Research*, 56, 7, 1485-1492, 2015.
7. Sanchez-Torres, A., Electrostatic Tether Application for Scattering of Relativistic Particles in the Earth's Radiation Belts, *IEEE Transactions on Plasma Science*, vol. 43, 9, 3109-3114, Sept. 2015.

8. Sanchez-Torres, A., Propulsive Force in an Electric Solar Sail for Outer Planet Missions, *IEEE Transactions on Plasma Science*, vol. 43, 9, 3130-3135, Sept. 2015.
9. Perez. R., Sanchez-Torres, A., Underwater Exploration mission on Europa Jovian Moon, *International Journal of Engineering Research and Science*, vol. 2, 7, 41-50, Oct. 2015.
10. Sanchez-Torres, A., Drag and Propulsive Forces in Electric Sails with negative polarity, *Advances in Space Research*, vol. 57, 4, 1065-1071, 2016.

Proceedings and Journals

1. Donoso, J.M., Sanchez-Torres, A., and Conde, L., Stability analysis for dusty plasma under grain charge fluctuations due to non-Maxwellian electron distributions, *Proceedings of the 37th EPS Conference on Plasma Physics*, vol 34A, ISBN: 2-914771-62-2, 2010.
2. Conde. L, Donoso, J.M., Sanchez-Torres, A., Tkachenko, I. M., de la Cal, E., Carralero, D., y Pablos, J.L., *Plasmas Granulares*, Real Sociedad Española de Física, Vol. 25-3. Julio-Septiembre, 2011.
3. Zanutto, D., Colombatti, G., Lorenzini, E., Sanchez-Torres, A., and Mantellato, R., Orbital debris mitigation through deorbiting with passive electrodynamic drag, *Proceedings of the 63th International Astronautical Congress, IAC-12-D9.2.8.*, ISBN: 978-1-6227-6979-7, 2012.
4. Sanmartin, J. R., Sanchez-Torres, A., Khan, S. B., Sanchez-Arriaga, G., and Charro, M., Tape-tether design for de-orbiting from given altitude and inclination, *Proceedings of the 6th European Conference on Space Debris*, ISBN: 978-92-9221-287-2, ESA, 2013.
5. Sanmartin, J. R., Charro, M., Sanchez-Arriaga, G., Sanchez-Torres, A., Tether-mission design for multiple flybys of moon Europa, *EPSC 2015-112*, 2015.
6. Sanchez-Torres A., Perez Fernandez, R., Misión de exploración submarina en Europa; una luna Galileana de Júpiter, *Ingeniería Naval. Revista del sector Marítimo*, No 942, pp. 77-83. Dic. 2015.

Conferences

1. Sanchez-Torres, A., Sanmartin J.R., and Donoso, J.M., The radiation impedance of electrodynamic tethers in Jupiter, *37th Cospar Scientific Assembly*, Montreal, Canada, July 2008.
2. Bombardelli, C., Sánchez-Torres, A., Charro, M., Sanmartin J.R., and Lorenzini, E.C., A low-orbit, science mission at Jupiter, *European Planetary Science Congress*, Postdam, Germany, September 13-18, 2009.
3. Sanmartin J. R., Bombardelli, C., Sanchez-Torres, A., A light tether mission at Jupiter, *SPINE Meeting*, ONERA, Toulouse, September 28-29, 2009.
4. Sanmartin J. R., Sanchez-Torres, A., Bombardelli, C., Charro, M., and Lorenzini, E. C., A Light Tether, Low-Orbit Scientific Mission at Jupiter, *3rd Europa Jupiter System Mission (EJSM) Instrument Workshop*, ESA, ESTEC, January 2010.
5. Sanchez-Torres, A. and Sanmartin, J. R. The radiation impedance of a current-carrying conductor in a JUNO-like Jovian orbit, *38th Cospar Scientific Assembly*, Bremen, Germany, July 2010.
6. Sanchez-Torres, A., L. Conde, and Donoso, J. M., The ionization instability of a weakly ionized dusty plasma with grain charge fluctuations, *38th Cospar Scientific Assembly*, Bremen, Germany, July 2010.
7. Sanmartin J. R., Sanchez-Torres, A., and Khan, S. B., Sheath Interference Effects in the Bare-tether Array of an Electric Solar Sail, *11th Spacecraft Charging Technology Conference*, Albuquerque, NM, 20-24 September 2010.
8. Sanmartin J. R. and Sanchez-Torres, A. Tether de-orbiting of satellite at end of mission, *39th COSPAR Scientific Assembly*, Mysore, India, July 14-22, 2012.
9. Zanutto, D., Colombatti, G., Lorenzini, E., Sanchez-Torres, A., and Mantellato, R., Orbital debris mitigation through deorbiting with passive electrodynamic drag, *63rd International Astronautical Congress*, Naples, Italy, October 1-5, 2012.

10. Perez, R., Sanchez-Torres, A. Underwater exploration mission on Europa Jovian moon, 63rd International Astronautical Congress, Naples, Italy, October 1-5, 2012.
11. Sanmartin, J. R., Sanchez-Torres, A., Khan, S. B., Sanchez-Arriaga, G., and Charro, M., Tape-tether design for de-orbiting from given altitude and inclination, 6th European Conference on Space Debris, April 22-25, 2013.
12. Sanchez-Torres, A., Propulsive Force in an Electric Solar Sail, IWEP 2013, International Workshop on Electric Probes in Magnetized Plasma, Madrid, Spain, 9-11 July, 2013.
13. Sanchez-Torres, A., Propulsive Force in an Electric Solar Sail for Outer Planet Missions, 13th Spacecraft Charging Technology Conference, Pasadena, California, June 23-27, 2014.
14. Sanchez-Torres, A., Application of Electrostatic Tethers for Scattering of Relativistic Particles in the Earths Radiation Belts, 13th Spacecraft Charging Technology Conference, Pasadena, California, June 23-27, 2014.
15. Sanmartin, J. R., Charro, M., Sanchez-Arriaga, G., Sanchez-Torres, A., Tether-mission design for multiple flybys of moon Europa, European Planetary Science Congress, Nantes, France, sept. 2015.
16. Sanchez-Torres, A., Perez, R., Misión de exploración submarina en Europa; una luna Galileana de Júpiter, 54 Congreso de Ingeniería Naval e Industria Marítima, Ferrol, Spain, Octubre 2015.

Collaborations on both National and International Projects

1. BETs: Propellantless deorbiting of space debris by bare electrodynamic tether (FP7 Space project, 262972), funded by the European Commission (2010-2014)
2. Amarras Electrodinámicas sin recubrimiento (Grant No. AYA2008-04769)
3. Autonomous GNC Design for NEO Rendezvous (CLEON+), funded by ESA/ESTEC (2008)
4. Tool for Terminal GNC Design for NEO Impactor Missions, funded by ESA/ESTEC (2008).
5. HARVD (High Integrity Autonomous RendezVous and Docking control system), funded by ESA (2008)
6. PARACHANT, funded by ESA/ESTEC (2007).

Honors and Awards

- COSPAR Associate (2015)
- European Space Agency award, JD7100 (2015)
- 2nd place award (Silver medal): Congreso de Ingeniería Naval e Industria Marítima (2015). Asociación de Ingenieros Navales y Oceánicos de España (AINE) y Colegio Oficial de Ingenieros Navales (COIN).

Research Activity

Main research interests

- Space propulsion: Electrodynamic tethers, Electric solar sails, Electric thrusters, plasma physics.
- Technologies for removing space debris and deflecting asteroids.

Further research interests

- Outer planet exploration missions
- Energy systems
- Space weather
- New technology concepts

Poetry books

1. Antonio Sánchez Torres, *A solas con Garcilaso*, Ed. Punto Didot. Grupo Bohodón Ediciones, 1-74, 2011. ISBN-13: 978-84-938279-2-2
2. Antonio Sánchez Torres, *El ruiñeñor de los versos*, Ed. Punto Didot. Grupo Bohodón Ediciones, 1-90, 2015. ISBN-13: 978-84-16031-82-5
3. Antonio Sánchez Torres, *Una lágrima cae en el viento*, Ed. Punto Didot. Grupo Bohodón Ediciones, 1-84, 2015. ISBN-13: 978-84-16031-96-2
4. Antonio Sánchez Torres, *Orfebres del alma*, Ed. Punto Didot. Grupo Bohodón Ediciones, 1-94, 2015. ISBN-13: 978-84-16437-02-3

Further interests and activities

- Poetry, music composition, piano playing, observational astronomy, oil and watercolor painting, sculptures, The Renaissance.