



## Amin Esmaeili

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Born: September 09, 1981—Fasa, Iran

Nationality: Iranian

Married

### Areas of specialisation

- Space Plasma Physics
- Numerical Simulation (PIC, Fluid, MHD)
- Parallel computation (MPI, OPenMP, OpenAC)
- FDTD, NS-FDTD
- Data analysis (IDL, Python)

### Education

- 1999-2004 BSc in Physics, Shiraz University, Iran (1<sup>st</sup> rank in specific courses)  
Project: Investigation of the correlation between electrons in many electron atoms in the view of quantum mechanics
- 2004-2007 MSc in Nuclear Eng., Fusion Reactor design, Amirkabir University of Technology, Iran (2<sup>nd</sup> rank among graduates)  
Project: Analysis and investigation of supersonic jet injection into tokomaks with Direct Simulation Monte Carlo (DSMC) Method
- 2010-2015 PhD in Computer Science (Space plasma simulation), University of Tsukuba, Japan  
Project: Large Scale 3D Electro-Magnetic Global Particle-In-Cell Simulation for Magnetosphere Focusing on CUSP Dynamics in Northward IMF

### Publications & talks

#### JOURNAL ARTICLES

- 2014 Esmaeili, Amin (2014), "Self-consistent hot spot tracing In kinetic simulation: a successive method to improve the test particles method", *The Open Plasma Phys. Journal* P194-198

- 2015 Cai, D.S., Amin Esmaili, B. Lembege and K. Nishikawa (2015), "Cusp dynamics under northward IMF using three-dimensional global particle-in-cell simulations", *J. of Geophys. Res., Space Physics* 120, doi:10.1002/2015JA021230
- 2015 Esmaili, Amin, T. Kamiyama, R. Oishi-Tomiyasi (2017), "New functions and graphical user interface attached to powder indexing software CONOGRAPH", *J. Appl. Cryst.* 50:651-659, doi:10.1107/S1600576717001145
- 2017 Esmaili, Amin, M. J. Kalae (2017), "Double cusp simulation during Northward IMF using 3D PIC global code", *Astrophysics and Space Science* 362:125, doi:10.1007/s10509-017-3098-8
- 2017 Esmaili, Amin, M. J. Kalae (2017), "A Comparative study of Alfvénic transition layer from 3D PIC simulation with Cluster experimental data, under southward IMF case", *Iranian Journal of Earth and Space Research* Article 6, Volume 43, Issue 3, Page 531-537, (In Farsi) doi:10.22059/JESPHYS.2016.59131
- 2017 Esmaili, Amin, M. J. Kalae (2017), "Self-Consistent hot spot tracing by kinetic simulations: With the emphasis on Cusp particle entry", *Iranian Journal of Earth and Space Physics* Article 8, Volume 42, Issue 4, Page 73-79 doi:10.22059/JESPHYS.2016.60291
- 2020 Esmaili, Amin, M. J. Kalae, M. Ikram (2020), "A simulation study of penetration and distribution of charged particles in the plasmasphere based on their initial energy", *Contribution to Plasma Physics*, 020;e202000164, <https://doi.org/10.1002/ctpp.202000164>
- 2020 Esmaili, Amin, M. Ikram, A. Mushtaq, A. A. Abid (2020), "A two-dimensional Weibel instability simulation using the non-extensive distribution function," *AIP Advances*, 10:115120, <https://doi.org/10.1063/5.0028596>
- 2021 Ahmad, Mushtaq; Amin Esmaili, M. Ikram, S. Ali (2021), "MHD waves with Landau diamagnetic pressure and Pauli paramagnetism in degenerate plasmas," *Physica Scripta B* 96 (015603015603), <https://doi.org/10.1088/1402-4896/abc648>
- 2021 Abdullah, A. A. Abid, S. Ali, Y. Al-Hadeethi, M. Ikram, and Amin Esmaili (2021), "The influence of multi-ion on the dust grain charging process in a Kappa-distributed dusty plasmas," *Results In Physics* 25:10415, <https://doi.org/10.1016/j.rinp.2021.104150>

#### **JOURNAL ARTICLES (ACCEPTED, SUBMITTED)**

- 2014 Esmaili, Amin, D. Sc. Cai, B. Lembege and K. Nishikawa (2014), "High-altitude cusp dynamics dependence on IMF direction: mainly focused on southward IMF," *IEEE, transactions on plasma science* Accepted
- 2017 Esmaili, Amin, M. J. Kalae (2017), "High-altitude cusp dynamics dependence on IMF direction: mainly focused on southward IMF," *Journal of Advances in Space Physics* Submitted
- 2018 D. S., Cai, B. Lembege, Amin Esmaili and K. Nishikawa (2018), "Particle precipitation to the cusp via ATL during Northward IMF and its application to the satellite data," *J. of Geophys. Res., Space Physics* Submitted

- 2019 D. S., Cai, Y. Kubota, S. Fujita, B. Lembège, Y. Jiang, H. Hasegawa, Amin Esmaili and T. K. M. Nakamura (2019), "Kármán Vortex Street and Strouhal Number in 3D global MHD simulations in Northward IMF," *J. of Geophys. Res., Space Physics* Submitted
- 2021 Esmaili, Amin (2021), "3D global PIC simulation of Alfvén Mach number effects on the magnetosphere dynamics under mostly northward IMF condition," *Journal of Atmospheric and Solar-Terrestrial Physics* Submitted
- 2021 Abid, A. A., B. M. Alotaibi, Q. M. Lu, M. Ikram, Amin Esmaili and Y. Al-Hadeethi (2021), "Influence of Xenon-Fluorine-Sulfur hexafluoride ( $Xe^+ - F^- - SF_6^-$ ) and Argon-Fluorine-Sulfur hexafluoride ( $Ar^+ - F^- - SF_6^-$ ) streaming on the dust grain charging process having a Cairn-Tsallis distributed plasmas", *Results in Physics* Submitted

#### REFEREED CONFERENCE ARTICLES

- 2014 Cai, D. S., Amin Esmaili, Bertrand Lembege, Ken-Ichi Nishikawa, "A large scale 3D global full particle simulation of the solar wind-terrestrial magnetosphere interaction: Impact of the IMF rotation on the magnetospheric cusp dynamics," *General Assembly and Scientific Symposium (URSIGASS), IEEE Conference Publications, 2014 XXXIth URSI*, pages: 1 – 4, doi:10.1109/URSIGASS.2014.6929906
- 2013 Cai, D. S., Amin Esmaili, Bertrand Lembege, Ken-Ichi Nishikawa, "3D Global Particle-In-Cell Simulation: Northward Case focusing on Cusp region in Northern Hemisphere," *The 11th International School for Space Simulations (ISSS-11) DVD, 20130721*, Solicited and Invited
- 2007 Esmaili, Amin, S. NourAzar, A. Ganjaei, "Simulation of supersonic jet injection into tokamaks with Direct Simulation Monte Carlo (DSMC) method," *28th ICPIG (International Conference on Phenomena of Ionized Gas)*, 2007
- 2006 M. Molaei; Amin Esmaili, "Analysis of stresses in ITER Divertor with the uses of ANSYS Software," *Iran Nuclear Conference*, www.nsi.ir

#### Conference Presentations

- 2019 Cai, D.S., Amin Esmaili, B. Lembege and K. I. Nishikawa, "Impact of the IMF rotation on the dynamics of the Alfvén Transition Layer : 3D PIC global simulation of the solar wind–terrestrial magnetosphere interaction," *EGU2019*
- 2018 Cai, D.S., B. Lembege, Amin Esmaili and K. I. Nishikawa, "Impact of the IMF Rotation on the depolarization front : 3D Full Particle Simulations of the Solar Wind-Terrestrial Magnetosphere Interactions," *EGU2018*
- 2017 Cai, D.S., K. I. Nishikawa, B. Lembege and Amin Esmaili, "3D Full particle simulations of the solar wind-terrestrial magnetosphere interaction: impact of the IMF rotation on the dipolarization process of magnetospheric dynamics," *AGU fall meeting*, New Orleans, USA, **(ORAL)**
- 2015 Cai, D.S., B. Lembege, Amin Esmaili and K. I. Nishikawa, "Particles momenta through the Alfvén transition layer of the cusp region : 3D global particle-in-cell simulations," *EGU2015*
- 2014 Cai, D.S., B. Lembege, Amin Esmaili and K. I. Nishikawa, "Analysis of the Alfvén transition layer in the cusp region by the use of 3D global particle-in-cell simulations," *AGU fall meeting*, San Francisco, USA
- 2014 Cai, D.S., Amin Esmaili, B. Lembege and K. I. Nishikawa, "3D Global PIC Simulation of Cusp Dynamics and Alfvénic Transition Layers at Cusp Outer Boundary During IMF Rotations from

- North to South," *AOGS 2014*, Sapporo, Japan
- 2013 Cai, D.S., Amin Esmaili, B. Lembege and K. I. Nishikawa, "3D Global Particle-In-Cell Simulation: Northward Case focusing on Cusp region in Northern Hemisphere," *ISSSI*, **(ORAL)**
- 2013 Cai, D.S., K. I. Nishikawa, B. Lembege and Amin Esmaili, "Large-scale Global 3D Full Particle Simulations of the Solar Wind-Terrestrial Magnetosphere Interaction," *AOGS 2013*
- 2013 Cai, D.S., B. Lembege, Amin Esmaili and K. I. Nishikawa, "Analysis of the Alfvénic transition layer at the outer boundary of the cusp: 3D large scale PIC simulation," *EGU2013-5444*, **(ORAL)**
- 2012 Lembege, B., D. S. Cai, Amin Esmaili and K. I. Nishikawa, "Dynamics of the cusp boundaries and particle entry during a Northward IMF period: 3-D PIC large scale simulation," *ICNS 2012*, **(ORAL)**
- 2012 Cai, D.S., B. Lembege, K. I. Nishikawa and Amin Esmaili, "Dynamics of the cusp boundaries and particle entry during a Northward IMF period: 3-D PIC large scale simulation," *AGU 2012*
- 2012 Cai, D.S., B. Lembege, Amin Esmaili and K. I. Nishikawa, "Dynamics of the cusp boundaries and particle entry during a Northward IMF period: 3-D PIC large scale simulation," *EGU2012-8044*
- 2011 Cai, D.S., B. Lembege, Amin Esmaili and K. I. Nishikawa, "Cusp Dynamics during the IMF rotation from Northward to Southward: 3-D PIC large scale simulation," *AOGS 2011*
- 2011 Cai, D.S., B. Lembege, Amin Esmaili and K. I. Nishikawa, "Deformation of the cusp boundary during the IMF rotation From Northward to Southward: 3-D PIC large scale simulation," *EGU2011*
- 2011 Cai, D.S., B. Lembege, Amin Esmaili and K. I. Nishikawa, "Dynamics of particle entries within the cusp boundary deformed during the IMF rotation from Northward to Dawn-Dusk," *AGU 2011*
- 2011 Cai, D.S., B. Lembege, Amin Esmaili and K. I. Nishikawa, "Magnetic Reconnection in Magnetosphere analyzed by Field Topology: Application to the Magnetotail and Subsolar Region," *EARTH-SUN SYSTEM EXPLORATION (ESSE)*, **(ORAL)**
- 2011 Esmaili, Amin and D. S. Cai, "Suggestion of a structural design for ICF pellets in order to reduce fluid instabilities," *IEEE ICOPS-SOFEII*, June, 26-30, Chicago, Illinois
- 2010 Cai, D.S., B. Lembege, K. I. Nishikawa and Amin Esmaili, "Progress In Modeling Kinetic-Global Coupling In Space Weather," *American Geophysical Union (AGU)*, Fall Meeting
- 2009 Esmaili, Amin, M. Rezvanijalal and A. Sirusi, "Numerical Investigation of Temporal Evolution of Perturbed Interface between Two Ideal Fluids in 3 Dimensional, Spherical Geometry," *4<sup>th</sup> IAEA- TM*
- 2008 Esmaili, Amin, M. Rezvanijalal and A. Sirusi, "Numerical Investigation of Temporal Evolution of Perturbed Interface between Two Ideal Magnetized Plasmas," *Institute of physics of Iran*
- 2007 Esmaili, Amin, S. NourAzar and A. Ganjaei, "Simulation of supersonic jet injection into tokamaks with Direct Simulation Monte Carlo (DSMC) method," *28<sup>th</sup> ICPIG(International Conference on Phenomena of Ionized Gas)*
- 2006 Molaei, M., Amin Esmaili, "Analysis of stresses in ITER Divertor with the uses of ANSYS Software," *Iran Nuclear Conference*, [www.nsi.ir](http://www.nsi.ir)

## Practical Experiences

- 2005 Simple modeling of a two group two region reactor
- 2007 Modelling of two-stream instability with PIC Method
- 2014 Contribution in developing space group software at KEK for Crystallography

## Work Experiences

- 2006-2009 Lecturer, Univ. of Applied Sci. and Tech, Tehran, Iran, Different basic courses (Mechanics, heat transfer Physics and Optics laboratory)
- 2010-2015 Teaching assistant, Univ. of Tsukuba, Tsukuba, Japan, April, 2010 – March, 2015
- 2010-2015 Research assistant, Univ. of Tsukuba, Tsukuba, Japan, April, 2010 – March, 2015
- 2014-2015 Research assistant, KEK (High Energy Accelerator Research Organization), Tsukuba, Japan, Crystallography, space group simulation, Dec. 2014 – Oct. 2015
- 2016-2017 PostDoc., Institute of Geophys., Tehran Univ., Solar-Trestrial simulation, April 2016 – April 2017
- 2017-2019 JST Researcher, Yamagata Univ., Japan, EBSD simulation, May, 2017 – March 2019
- 2019-2020 Part time lecturer, Master thesis advisor, Thesis title: lower cover cloud and GCR correlation using observational data, Yazd Univ., Sept. 2019 - Oct. 2020

## Research grants

- 2013 research grant for double cusp simulation, granted to our group to cooperate with ISSI, UCLA, USA
- May 2013 1500USD, research fund for EGU2013 attendance, Austria
- 2016-2017 7000USD, research grant, Elites association of Iran
- 2016-2017 1500USD, laboratory research usage grant, Elites association of Iran
- 2016-2017 3000USD, Travel research grant, Elites association of Iran
- 8-14 Dec., 2019 Travel fund for a week research visit to KIS, Germany

## Honors & Awards

- 2004 Privilege for free education with rank of 13 out of 15000 participants in Graduate National Entrance Exam held by The Educational Measurement and Evaluation Organization of Iran (EMEO), Feb 2004, Iran
- 1999 Privilege for free education with rank of 5500 out of 350000 participants in Undergraduate National Entrance Exam held by The Educational Measurement and Evaluation Organization of Iran (EMEO), July 1999, Iran
- 2004-2007 Honored as the second rank among the graduate students, Amirkabir University of Technology
- 2010-2013 Privilege for Nikki/Saneyoushi scholarship
- 2014-2015 Privilege for Jasso scholarship
- 2010-2015 Privilege for RA and TA from

## Active Collaborations

1. Univ. of Tsukuba: solar-terrestrial simulation
2. KIS (Kiepenheuer Institute for Solar Physics), Germany: data analysis for Sun's Chromosphere research, FITS file format, IDL

## Computer Skills

### EXPERTISE

Windows, Microsoft Office, C++, Visual Basic, Python, Mayavi, IDL  
OpenMPI, Spedas, OpenCV, GoLang, Fortran, Techplot, Paraview, Linux, Golang, SQL, .NET

### NOT EXPERTISE

MATLAB (7.0)

## Workshops

Fall 2011 MPI workshop, Toyo Univ.  
Fall 2012 MPI workshop, Intel (Tokyo)  
July 2013 11<sup>th</sup> International School/Symposium for Space Simulations, ISSS-II, China

## Language proficiency

TOEFL(iBT)

R:26 L:27 S:15 W:20 T:88

JAPANESE LANGUAGE

Speaking and listening (average), Reading and Writing (elementary, about 400 Kanji)

## Hobbies

Theater (Acting, directing), Playing music (Nei), Swimming