

# Hongyang Zhou

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## EMPLOYMENT

|                               |                   |
|-------------------------------|-------------------|
| <b>Boston University</b>      | Boston, MA        |
| Research Scientist            | 2023/10-now       |
| <b>University of Helsinki</b> | Helsinki, Finland |
| Postdoctoral Researcher       | 2020/11-2023/05   |
| <b>University of Michigan</b> | Ann Arbor, MI     |
| Research Assistant            | 2015/08-2020/09   |

## EDUCATION

|   |                 |
|---|-----------------|
| <b>University of Michigan</b>                               | Ann Arbor, MI   |
| Ph.D of Climate and Space Sciences and Scientific Computing | 2015/08-2020/09 |
| <b>University of Science and Technology of China (USTC)</b> | Anhui, China    |
| Bachelor of Geophysics                                      | 2011/09-2015/06 |

## AWARDS

|   |      |
|---|------|
| <b>University of Michigan</b>   | 2020 |
| Climate and Space Sciences Outstanding Doctoral Student Research Award    |      |
| <b>University of Michigan</b>   | 2016 |
| Michigan Institute for Computational Discovery and Engineering Fellowship |      |
| <b>USTC</b>   | 2015 |
| Outstanding Teaching Scholarship  |      |
| <b>USTC</b>   | 2014 |
| The First Prize, Outstanding Student Scholarship                          |      |

## EXPERIENCE

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|---|-----------------|
| <b>Planetary Magnetosphere Modeling</b>   | 2023/10-now     |
| <i>Supervisor: Chuanfei Dong</i>  |                 |
| • Studying Earth and planetary magnetospheres with numerical simulations  |                 |
| • Developing kinetic shock and foreshock models   |                 |
| <b>Hybrid Vlasov Ultra-Low Frequency (ULF) Wave Simulations</b>   | 2020/11-2023/05 |
| <i>Supervisor: Lucile Turc &amp; Minna Palmroth</i>   |                 |
| • Developed time-varying boundary conditions in <a href="#">Vlasiator</a> and the postprocessing package <a href="#">Vlasiator.jl</a> |                 |
| • Studied ULF waves properties in Earth's magnetosheath and foreshock using global 2D simulations                                     |                 |
| <b>SWMF Model Development</b>   | 2015-2020       |
| <i>Supervisor: Gábor Tóth</i>   |                 |
| • Developed new boundary setups and extended MPI-OpenMP parallel code capability for <a href="#">BATS-R-US</a>                        |                 |
| • Developed an open-source package <a href="#">Batsrus.jl</a> for efficient data processing, analysis and visualization               |                 |
| • Initiated a GPU-portable magnetohydrodynamic (MHD) solver with OpenACC, OpenMP & CUDA   |                 |
| <b>MHD-EPIC Simulation of Ganymede's Magnetosphere</b>  | 2016-2020       |
| <i>Supervisor: Gábor Tóth &amp; Xianzhe Jia</i>   |                 |
| • Constructed a global magnetosphere model by coupling Hall MHD with Particle-In-Cell in generalized coordinates                      |                 |
| • Analyzed the magnetic reconnection processes at Ganymede  |                 |

## TEACHING

## Space Applications of Plasma Physics

Guest Lecturer

University of Helsinki

2022

## Plasma Physics

Guest Lecturer

University of Helsinki

2022

## Electrodynamics

Teaching Assistant

USTC

2015

## SKILLS

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Programming Languages - Julia, Fortran, C, C++, MATLAB, Python, IDL, CUDA, Rust, Perl, LaTeX

3D Visualization & Rendering - Paraview, VisIt, Tecplot

Languages - English, Mandarin

## PUBLICATIONS

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Anomalous Transient Enhancement of Planetary Ion Escape at Mars

*Zhang, Chi and Dong, Chuanfei and Zhou, Hongyang and Halekas, Jasper and Yamauchi, Masatoshi and Nilsson, Hans and Liu, Terry and Persson, Moa and Curry, Shannon and Dong, Yaxue and Futaana, Yoshifumi and Chen, Yuxi and Zhou, Muni and Suranga, Ruhunusiri and Hanley, Kathleen and Mazelle, Christian and Xu, Shaosui and Ramstad, Robin and Holmstrom, Mats and Chen, Li-Jen*, Nature Communications, 2025

Observational characteristics of electron distributions in the Martian induced magnetotail

*Zhang, Chi and Dong, Chuanfei and Zhou, Hongyang and Deca, Jan and Xu, Shaosui and Harada, Yuki and Curry, Shannon M and Mitchell, David L and Liu, Zhi-Yang and Qin, Junfeng and others*, Geophysical Research Letters, 2025

Interplay of magnetic reconnection and current sheet kink instability in the Earth's magnetotail

*Cozzani, Giulia and Alho, M and Zaitsev, Ivan and Zhou, Hongyang and Hoilijoki, Sanni and Turc, Lucile and Grandin, Maxime and Horaites, Konstantinos and Battarbee, Markus and Pfau-Kempf, Yann and others*, Geophysical Research Letters, 2025

The Vlasiator 5.2 Ionosphere–Coupling a magnetospheric hybrid-Vlasov simulation with a height-integrated ionosphere model

*Ganse, Urs and Pfau-Kempf, Yann and Zhou, Hongyang and Juusola, Liisa and Workayehu, Abiyot and Kebede, Fasil and Papadakis, Konstantinos and Grandin, Maxime and Alho, Markku and Battarbee, Markus and others*, Geoscientific Model Development Discussions, 2024

Hybrid-Vlasov modelling of ion velocity distribution functions associated with the Kelvin-Helmholtz instability with a density and temperature asymmetry

*Tarvus, Vertti and Lurc, Lucile and Zhou, Hongyang and Nakamura, Takuma and Settino, Adriana and Blasl, Kevin and Cozzani, Giulia and others*, AAS, 2024

Source of Drift-dispersed Electrons in Martian Crustal Magnetic Fields

*Zhang, Chi and Zhou, Hongyang and Dong, Chuanfei and Harada, Yuki and Yamauchi, Masatoshi and Xu, Shaosui and Nilson, Hans and Ebihara, Yusuke and Curry, Shannon M. and Qin, Junfeng and Mitchell, David L. and Brain, David A.*, Astrophysical Journal, 2024

Finding reconnection lines and flux rope axes via local coordinates in global ion-kinetic magnetospheric simulations

*Alho, M., Cozzani, G., Zaitsev, I., Kebede, F. T., Ganse, U., Battarbee, M., Bussov, M., Dubart, M., Hoilijoki, S., Kotipalo, L., Papadakis, K., Pfau-Kempf, Y., Suni, J., Tarvus, V., Workayehu, A., Zhou, H., and Palmroth, M.*, Annales Geophysicae, 2024

Kinetic signatures, dawn-dusk asymmetries, and flux transfer events associated with Mercury's dayside magnetopause reconnection from 3D MHD-AEPIC simulations

*Li, Changkun and Jia, Xianzhe and Chen, Yuxi and Tóth, Gábor and Zhou, Hongyang and Slavin, James A and Sun, Weijie and Poh, Gangkai*, JGR, 2024

Dayside Pc2 Waves Associated With Flux Transfer Events in a 3D Hybrid-Vlasov Simulation

*Tesema, Facil and Palmroth, Minna and Turc, Lucile and Zhou, Hongyang and Cozzani, Giulia and Alho, Markku and Pfau-Kempf, Yann and Horaites, Konstantinos and Zaitsev, Ivan and Grandin, Maxime*, GRL, 2024

Vlasiator. jl: A Julia package for processing Vlasiator data  
**Zhou, Hongyang**, Journal of Open Source Software, 2023

FLEKS: A flexible particle-in-cell code for multi-scale plasma simulations  
*Chen, Yuxi and Tóth, Gábor and Zhou, Hongyang and Wang, Xiantong*, CPC, 2023

Enabling technology for global 3D + 3V hybrid-Vlasov simulations of near-Earth space  
*Ganse, U. and Koskela, T. and Battarbee, M. and Pfau-Kempf, Y. and Papadakis, K. and Alho, M. and Bussov, M. and Cozzani, G. and Dubart, M. and George, H. and Gordeev, E. and Grandin, M. and Horaites, K. and Suni, J. and Tarvus, V. and Kebede, F. T. and Turc, L. and Zhou, H. and Palmroth, M.*, Physics of Plasmas, 2023

Magnetospheric Response to a Pressure Pulse in a Three-Dimensional Hybrid-Vlasov Simulation  
*Horaites, Konstantinos and Rintamäki, E and Zaitsev, I and Turc, L and Grandin, M and Cozzani, G and Zhou, Hongyang and Alho, M and Suni, J and Kebede, F and others*, JGR, 2023

Magnetotail plasma eruptions driven by magnetic reconnection and kinetic instabilities  
*Palmroth, Minna and Pulkkinen, Tuija I and Ganse, Urs and Pfau-Kempf, Yann and Koskela, Tuomas and Zaitsev, Ivan and Alho, Markku and Cozzani, Giulia and Turc, Lucile, Zhou, Hongyang and others*, Nature Geoscience, 2023

First 3D hybrid-Vlasov global simulation of auroral proton precipitation and comparison with satellite observations

*Grandin, M. and Luttikhuis, T. and Battarbee, M. and Cozzani, G. and Zhou, H. and Turc, L. and Pfau-Kempf, Y.*, Journal of Space Weather and Space Climate, 2023

Magnetospheric responses to solar wind Pc5 density fluctuations: Results from 2D hybrid Vlasov simulation  
**Zhou, Hongyang and Turc, Lucile and Pfau-Kempf, Yann and Battarbee, Markus and Tarvus, Vertti and Dubart, Maxime and George, Harriet and Cozzani, Giulia and Grandin, Maxime and Ganse, Urs**, Frontiers in Astronomy and Space Sciences, 2022

A global view of Pc3 wave activity in near-Earth space: Results from hybrid-Vlasov simulations  
*Turc, Lucile and Zhou, Hongyang and Tarvus, Vertti and Ala-Lahti, Matti and Battarbee, Markus and Pfau-Kempf, Yann and Johlander, Andreas and Ganse, Urs and Dubart, Maxime and George, Harriet and others*, Frontiers in Astronomy and Space Sciences, 2022

Quasi-parallel Shock Reformation Seen by Magnetospheric Multiscale and Ion-kinetic Simulations  
*A. Johlander and M. Battarbee and L. Turc and U. Ganse and Y. Pfau-Kempf and M. Grandin and J. Suni and V. Tarvus and M. Bussov and H. Zhou and others*, GRL, 2022

Estimating inner magnetospheric radial diffusion using a hybrid-Vlasov simulation  
*H. George and E. Kilpua and A. Osmane and S. Lejosne and L. Turc and M. Grandin and M. M. H. Kalliokoski and S. Hoilijoki and U. Ganse and M. Alho and M. Battarbee and M. Bussov and M. Dubart and A. Johlander and T. Manglayev and K. Papadakis and Y. Pfau-Kempf and J. Suni and H. Zhou and M. Palmroth*, Frontiers in Astronomy and Space Sciences, 2022

Reconnection-driven dynamics at Ganymede's upstream magnetosphere: 3-D global Hall MHD and MHD-EPIC simulations

**Zhou, Hongyang and Tóth, Gábor and Jia, Xianzhe and Chen, Yuxi**, JGR, 2020

Efficient OpenMP parallelization to a complex MPI parallel magnetohydrodynamics code  
**Zhou, Hongyang and Tóth, Gábor**, Journal of Parallel and Distributed Computing, 2020

Embedded kinetic simulation of Ganymede's magnetosphere: Improvements and inferences  
**Zhou, Hongyang and Tóth, Gábor and Jia, Xianzhe and Chen, Yuxi and Markidis, Stefano**, JGR, 2019