Hongyang Zhou

hongyang@bu.edu · Github

EMPLOYMENT

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

EDUCATION

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

AWARDS

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

EXPERIENCE

Planetary Magnetosphere Modeling	2023/10-now

Supervisor: Chuanfei Dong
- Studying Earth and planetary magnetospheres with numerical simulations
- Developing kinetic shock and foreshock models

Hybrid Vlasov Ultra-Low Frequency (ULF) Wave Simulations	2020/11-2023/05

Supervisor: Lucile Turc & Minna Palmroth
- Developed time-varying boundary conditions in Vlasiator and the postprocessing package Vlasiator.jl
- Studied ULF waves properties in Earth's magnetosheath and foreshock using global 2D simulations

SWMF Model Development	2015-2020

Supervisor: Gábor Tóth

- Developed new boundary setups and extended MPI-OpenMP parallel code capability for BATS-R-US
- Developed an open-source package Batsrus.jl for efficient data processing, analysis and visualization
- Initiated a GPU-portable magnetohydrodynamic (MHD) solver with OpenACC, OpenMP & CUDA

MHD-EPIC Simulation of Ganymede's Magnetosphere	2016-2020

Supervisor: Gábor Tóth & Xianzhe Jia
- 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 — University of Helsinki
Guest Lecturer — 2022
Plasma Physics — University of Helsinki
Guest Lecturer — 2022
Electrodynamics — USTC
Teaching Assistant — 2015

SKILLS

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

3D Visualization Tools - Paraview, VisIt, Tecplot

Languages - English, Mandarin

PUBLICATIONS

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