CAOXIANG ZHU

Ph.D.
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Education

- **University of Science and Technology of China** — **Hefei, China**
  Ph.D. in Nuclear Science and Technology — Sept 2012 – Feb 2018
  Supervisors: Prof. Yuanxi Wan and Prof. Yuntao Song
  Dissertation: *A new method for designing three-dimensional coils in advanced stellarators.*
- **University of Science and Technology of China** — **Hefei, China**
  Bachelor of Nuclear Engineering and Technology — Sept 2008 – June 2012

Research Experience

Princeton Plasma Physics Laboratory — **Princeton, NJ**
Stellarator Optimization Scientist (postdoc); Supervisor: Dr. David A. Gates — Feb 2018 – present

- Developing optimization tools for optimizing stellarator physics and engineering;
- Exploring novel designs for three-dimensional coils in tokamaks and stellarators;
- Participate the design activities of the next generation stellarator.

Princeton Plasma Physics Laboratory — **Princeton, NJ**
Visiting Research Scholar; Supervisor: Dr. Stuart R. Hudson — Sept 2015 – Sept 2017

- Developed a new stellarator coil design code FOCUS using fully 3D representations and applying fast, robust optimization algorithms
- Demonstrated coil optimizations for existing stellarators and investigated coil solutions for the next generation stellarators designs, including LHD-like, HSX-like and CNT-like machines;
- Introduced a new approach to analyze the coil sensitivities on error fields using the eigenvalues and eigenvector of the Hessian matrix;
- Modified FOCUS compatible to explore a unique method designing resonant magnetic perturbation (RMP) coils in DIII-D, in collaboration with Nikolas Logan.

University of Science and Technology of China — **Hefei, China**
Graduate Research Assistant; Supervisor: Dr. Yuntao Song — Sept 2012 – Aug 2015

- Participated the engineering design group of CFETR machine and evaluated the electromagnetic and mechanical performance of TF coils system using ANSYS;
- Measured the magnetic field ripple of test TF coils of KTX machine and conducted electromagnetic and mechanical analysis for the main coils system.

Research Skills

- Proficient in code developing under Linux/OSX/Windows environments with Fortran/C++;

- Accomplished in operating multiple physics codes in MHD and stellarator optimizations;
- Responsible to manage the users group of FOCUS via GitHub;
- Fluent in data processing and scientific virtualization with Python/Matlab;
- Familiar with using CAE software ANSYS and CAD tool CATIA & AutoCAD;

University Service

- Served as monitor for a graduate class of 68 students from 2012 to 2015;
- Helped organized several university-wide events when positioned the vice president of the Graduate Student Association of USTC in 2014;
- Acted as volunteering tutor of the Science Open Week in USTC in 2013 & 2014 and student volunteer at the 58th Annual meeting of APS DPP;

Awards

- *Best student presentation Award*, International Stellarator-Heliotron Workshop 2017
- *National Graduate Scholarship Award*, Ministry of Education of China 2017
- *Sherwood Student Poster Award*, International Sherwood Fusion Theory Conference 2017
- *China Scholarship Council Scholarship*, China Scholarship Council(CSC) 2015 – 2017
- *National Graduate Scholarship Award*, Ministry of Education of China 2013
- *Excellent Student Cadre Award*, University of Science and Technology of China 2013

Publications

- **Zhu, C.**, Hudson, S. R., Song, Y., & Wan, Y. (2018). Designing stellarator coils by a modified Newton method using FOCUS. *Plasma Physics and Controlled Fusion*, **60**(6), 065008.
- **Zhu, C.**, Hudson, S. R., Lazerson, S.A., Song, Y., & Wan, Y. (2018). Hessian matrix approach for determining error field sensitivity to coil deviations. *Plasma Physics and Controlled Fusion*, **60**(5), 054016.
- **Zhu, C.**, Hudson, S. R., Song, Y., & Wan, Y. (2017). New method to design stellarator coils without the winding surface. *Nuclear Fusion,* **58** 016008.
- **Zhu, C.**, Zheng, J., Liu, X., Wang, L., & Kang, R. (2015). Electromagnetic and mechanical analysis of CFETR toroidal field coils. *Fusion Engineering and Design*, 101, 9-16.
- Wang, L., Zheng, J., Hao, J., Jiang, F., & **Zhu, C.** (2015). Evaluations of CFETR ripple and optimization analyses of ferromagnetic inserts. *Fusion Engineering and Design*, 100, 513-518.
- Zheng, J. X., Song, Y. T., Liu, X. F., Li, J. G., Wan, Y. X., Wan, B. N., Lei, M. Z., **Zhu, C. X.**, Kang, R. & Khan, S. U. (2015). Conceptual design of the CFETR toroidal field superconducting coils. *IEEE Transactions on Applied Superconductivity*, 25(2), 1-9.

Presentations

- **Zhu, C.**, Hudson, S. R., Lazerson, S.A. &Gates, D.A. Hessian matrix approach for determining error field sensitivity to coil deviations. **Invited talk** delivered at *the Sherwood Fusion Theory Conference*, Auburn, USA, April, 2018.
- Kruger, T., **Zhu, C.**, Bader, A., Singh, L. and Anderson, D. Improving coil designs for the HSX stellarator with FOCUS. **Poster presentation** delivered at *the 59th Annual Meeting of the APS Division of Plasma Physics*, Milwaukee, USA, October, 2017.

- Logan, N. C. and **Zhu, C.** Optimization of 3D Field Design. **Poster presentation** delivered at *the 59th Annual Meeting of the APS Division of Plasma Physics*, Milwaukee, USA, October, 2017.
- **Zhu, C.**, Hudson, S. R., Song, Y. & Wan, Y. Hessian matrix used for stellarator coil design and error fields prediction. **Selected oral presentation** delivered at *the 21st International Stellarator-Heliotron Workshop*, Kyoto, Japan, October, 2017.
- **Zhu, C.**, Hudson, S. R., Song, Y. & Wan, Y. Flexible optimized coil designing method using space curves. **Poster presentation** delivered at *the Sherwood Fusion Theory Conference*, Annapolis, USA, May, 2017.
- **Zhu, C.**, Hudson, S. R., Song, Y. & Wan, Y. A new stellarator coil design tool using space curves. **Poster presentation** delivered at *the 58th Annual Meeting of the APS Division of Plasma Physics*, San Jose, USA, October, 2016.