

Dr. David Pfefferle  
Mathematics and Statistics  
**Postal address:**  
The University of Western Australia (M019), 35 Stirling Highway,  
6009  
Perth  
Western Australia  
Australia  
**Email:** david.pfefferle@uwa.edu.au  
**Phone:** +61 8 6488 3190

## Employment

### Lecturer

Mathematics and Statistics  
The University of Western Australia  
4 Jan 2018 → present

### Associate Research Physicist

Princeton Plasma Physics Laboratory  
United States  
15 Aug 2015 → 15 Oct 2017

### Postdoctoral Research Associate

Swiss Federal Institute of Technology Lausanne  
Lausanne, Switzerland  
1 May 2015 → 1 Aug 2015

### Graduate Research Assistant

Swiss Federal Institute of Technology Lausanne  
Lausanne, Switzerland  
15 Feb 2011 → 1 May 2015

## Research outputs

### Validation of the BEAMS3D neutral beam deposition model on Wendelstein 7-X

Lazerson, S. A., Ford, O. P., Nuehrenberg, C., Åkäslompolo, S. J., Poloskei, P. Z., Machielsen, M., McNeely, P., Vano, L., Rust, N., Bozhenkov, S. A., Neelis, T., Graves, J. P., Pfefferlé, D., Spanier, A., Hartmann, D., Marushchenko, N. B., Turkin, Y., Hirsch, M., Chaudhary, N., Höfel, U. & 29 others, Stange, T., Weir, G. M., Pablant, N. A., Langenberg, A., Traverso, P., Valson, P., Knauer, J. P., Brunner, K. J., Pasch, E., Beurskens, M. N. A., Damm, H., Fuchert, G., Nelde, P., Scott, E. R., Hergenhan, U., Pavone, A., Rahbarnia, K., Andreeva, T., Schilling, J., Brandt, C., Neuner, U., Thomsen, H., Jakubowski, M., Ali, A., Gao, Y., Niemann, H., Puig Sitjes, A., Koenig, R. & Wolf, R. C., Jul 2020, In : Nuclear Fusion.

### Energy and momentum conservation in the Euler-Poincaré formulation of local Vlasov-Maxwell-type systems

Hirvijoki, E., Burby, J. W., Pfefferlé, D. & Brizard, A. J., 19 May 2020, In : Journal of Physics A : Mathematical and Theoretical. 53, 23, 20 p., 235204.

### Rigidity of MHD equilibria to smooth incompressible ideal motion near resonant surfaces

Pfefferlé, D., Noakes, L. & Zhou, Y., 23 Apr 2020, In : Plasma Physics and Controlled Fusion. 9 p.

### Identification of an Optimized Heating and Fast Ion Generation Scheme for the Wendelstein 7-X Stellarator

W7-X Team & JET contributors, 15 Apr 2020, In : Physical Review Letters. 124, 15, 6 p., 155001.

### Whittle Maximum Likelihood Estimate of spectral properties of Rayleigh-Taylor interfacial mixing using hot-wire anemometry experimental data

Pfefferlé, D., Ranjan, D. & Abarzhi, S. I., 2020, (Submitted) In : Chaos: an interdisciplinary journal of nonlinear science. 8 p.

**Gauge freedom in magnetostatics and the effect on helicity in toroidal volumes**

Pfefferlé, D. & Noakes, L., 6 Sep 2019, (Submitted) arXiv preprint 15 p.

**Orbit physics in discontinuous fields: open questions**

Pfefferlé, D., 25 Jun 2019.

**Monte-Carlo/PIC methods to solve Vlasov-Boltzmann equation**

Pfefferlé, D., 24 Jun 2019.

**NSTX/NSTX-U theory, modeling and analysis results**

Kaye, S. M., Battaglia, D. J., Baver, D., Belova, E., Berkery, J. W., Duarte, V. N., Ferraro, N., Fredrickson, E., Gorelenkov, N., Guttenfelder, W., Hao, G. Z., Heidbrink, W., Izacard, O., Kim, D., Krebs, I., La Haye, R., Lestz, J., Liu, D., Morton, L. A., Myra, J. & 71 others, Pfefferle, D., Podesta, M., Ren, Y., Riquezes, J., Sabbagh, S. A., Schneller, M., Scotti, F., Soukhanovskii, V., Zweben, S. J., Ahn, J. W., Allain, J. P., Barchfeld, R., Bedoya, F., Bell, R. E., Bertelli, N., Bhattacharjee, A., Boyer, M. D., Brennan, D., Canal, G., Canik, J., Crocker, N., Darrow, D., Delgado-Aparicio, L., Diallo, A., Domier, C., Ebrahimi, F., Evans, T., Fonck, R., Frerichs, H., Gan, K., Gerhardt, S., Gray, T., Jarboe, T., Jardin, S., Jaworski, M. A., Kaita, R., Koel, B., Kolemen, E., Kriete, D. M., Kubota, S., LeBlanc, B. P., Levinton, F., Luhmann, N., Lunsford, R., Maingi, R., Maqueda, R., Menard, J. E., Mueller, D., Myers, C. E., Ono, M., Park, J-K., Perkins, R., Poli, F., Raman, R., Reinke, M., Rhodes, T., Rowley, C., Russell, D., Schuster, E., Schmitz, O., Sechrest, Y., Skinner, C. H., Smith, D. R., Stotzfus-Dueck, T., Stratton, B., Taylor, G., Tritz, K., Wang, W., Wang, Z., Waters, I. & Wirth, B., 5 Jun 2019, In : Nuclear Fusion. 59, 16 p., 112007.

**Guiding-centre theory for kinetic-magnetohydrodynamic modes in strongly flowing plasmas**

Lanthaler, S., Graves, J. P., Pfefferlé, D. & Cooper, W. A., 30 May 2019, In : Plasma Physics and Controlled Fusion. 61, 7, 21 p., 074006.

**Rigidity of MHD equilibrium states to smooth ideal motion**

Pfefferlé, D. & Noakes, L., 28 Mar 2019.

**Heavy impurity transport in tokamaks with plasma flows and saturated 3D perturbations**

Neto, E., Graves, J. P., Raghunathan, M., Lanthaler, S., Pfefferlé, D., Cooper, W. A. & Sommariva, C., 2019.

**Particle motion in 3D MHD equilibria versus relaxed states**

Pfefferlé, D., 9 Dec 2018.

**What may the experimental and numerical data tell us on properties of Rayleigh-Taylor interfacial mixing?**

Pfefferlé, D. & Abarzhi, S., 9 Dec 2018.

**Coordinate-free Grad-Shafranov equation on a Riemannian manifold with Killing field**

Pfefferlé, D., Noakes, L. & Mangalath, V., Nov 2018.

**Differentiating the shape of stellarator coils with respect to the plasma boundary**

Hudson, S. R., Zhu, C., Pfefferlé, D. & Gunderson, L., 29 Sep 2018, In : Physics Letters, Section A: General, Atomic and Solid State Physics. 382, 38, p. 2732-2737 6 p.

**Non-planar elasticae as optimal curves for the magnetic axis of stellarators**

Pfefferlé, D., Gunderson, L., Hudson, S. R. & Noakes, L., 1 Sep 2018, In : Physics of Plasmas. 25, 9, 092508.

**The effect of magnetic equilibrium on auxiliary heating schemes and fast particle confinement in Wendelstein 7-X**

Patten, H., Graves, J. P., Faustin, J., Cooper, W. A., Geiger, J., Pfefferle, D. & Turkin, Y., Aug 2018, In : Plasma Physics and Controlled Fusion. 60, 8, 17 p., 085009.

### **Equivalent elastica knots**

Brizard, A. J. & Pfefferlé, D., 12 Jul 2018, (Unpublished)

### **The VENUS-LEVIS orbit solver**

Pfefferlé, D., 28 Jun 2018.

### **Modelling of NSTX hot vertical displacement events using M3D-C1**

Pfefferlé, D., Ferraro, N., Jardin, S. C., Krebs, I. & Bhattacharjee, A., 2 May 2018, In : Physics of Plasmas. 25, 5, p. 056106

### **Algebraic motion of vertically displacing plasmas**

Pfefferlé, D. & Bhattacharjee, A., 1 Feb 2018, In : Physics of Plasmas. 25, 2, p. 022516

### **The ins and outs of modelling vertical displacement events**

Pfefferlé, D., 24 Oct 2017.

### **Heavy impurity confinement in hybrid operation scenario plasmas with a rotating 1/1 continuous mode**

Raghunathan, M., Graves, J. P., Nicolas, T., Cooper, W. A., Garbet, X. & Pfefferlé, D., 9 Oct 2017, In : Plasma Physics and Controlled Fusion. 59, 12, 124002.

### **Overview of the JET results in support to ITER**

JET contributors, 15 Jun 2017, In : Nuclear Fusion. 57, 10, 102001.

### **Modelling of advanced three-ion ICRF heating and fast ion generation scheme for tokamaks and stellarators**

Faustin, J. M., Graves, J. P., Cooper, W. A., Lanthaler, S., Villard, L., Pfefferlé, D., Geiger, J., Kazakov, Y. O. & Eester, D. V., 13 Jun 2017, In : Plasma Physics and Controlled Fusion. 59, 8, 084001.

### **Nonlinear resistivity for magnetohydrodynamical models**

Lingam, M., Hirvijoki, E., Pfefferlé, D., Comisso, L. & Bhattacharjee, A., 1 Apr 2017, In : Physics of Plasmas. 24, 4, 042120.

### **Exact collisional moments for plasma fluid theories**

Pfefferlé, D., Hirvijoki, E. & Lingam, M., Apr 2017, In : Physics of Plasmas. 24, 4, 42118 p.

### **Higher order Larmor radius corrections to guiding-centre equations and application to fast ion equilibrium distributions**

Lanthaler, S., Pfefferlé, D., Graves, J. P. & Cooper, W. A., 15 Mar 2017, In : Plasma Physics and Controlled Fusion. 59, 4, 044014.

### **The DEMO wall load challenge**

Weninger, R., Albanese, R., Ambrosino, R., Arbeiter, F., Aubert, J., Bachmann, C., Barbato, L., Barrett, T., Beckers, M., Biel, W., Boccaccini, L., Carralero, D., Coster, D., Eich, T., Fasoli, A., Federici, G., Firdaouss, M., Graves, J. P., Horacek, J., Kovari, M. & 17 others, Lanthaler, S., Loschiavo, V., Lowry, C., Lux, H., Maddaluno, G., Maviglia, F., Mitteau, R., Neu, R., Pfefferle, D., Schmid, K., Siccino, M., Sieglin, B., Silva, C., Snicker, A., Subba, F., Varje, J. & Zohm, H., 9 Feb 2017, In : Nuclear Fusion. 57, 4, 046002.

### **Differential formulation of the gyrokinetic Landau operator**

Hirvijoki, E., Brizard, A. J. & Pfefferlé, D., 1 Feb 2017, In : Journal of Plasma Physics. 83, 1, 595830102.

### **Fluid moments of the nonlinear Landau collision operator**

Hirvijoki, E., Lingam, M., Pfefferlé, D., Comisso, L., Candy, J. & Bhattacharjee, A., 1 Aug 2016, In : Physics of Plasmas. 23, 8, 080701.

### **Fast particle loss channels in Wendelstein 7-X**

Faustin, J. M., Cooper, W. A., Graves, J. P., Pfefferlé, D. & Geiger, J., 29 Jul 2016, In : Nuclear Fusion. 56, 9, 092006.

**Effects of magnetic ripple on 3D equilibrium and alpha particle confinement in the European DEMO**  
Pfefferlé, D., Cooper, W. A., Fasoli, A. & Graves, J. P., 22 Jul 2016, In : Nuclear Fusion. 56, 11, 112002.

**ICRH induced particle losses in Wendelstein 7-X**  
Faustin, J. M., Cooper, W. A., Graves, J. P., Pfefferlé, D. & Geiger, J., 31 May 2016, In : Plasma Physics and Controlled Fusion. 58, 7, 074004.

**Saturated ideal kink/peeling formations described as three-dimensional magnetohydrodynamic tokamak equilibrium states**  
Cooper, W. A., Brunetti, D., Duval, B. P., Faustin, J. M., Graves, J. P., Kleiner, A., Patten, H., Pfefferlé, D., Porte, L., Raghunathan, M., Reimerdes, H., Sauter, O. & Tran, T. M., 1 Apr 2016, In : Physics of Plasmas. 23, 4, 040701.

**Extended-MHD modeling of tokamak disruptions and resistive wall modes with M3D-C1**  
Ferraro, N. M., Pfefferlé, D., Jardin, S. C., Myers, C. E. & Lao, L. L., 1 Jan 2016, *43rd European Physical Society Conference on Plasma Physics, EPS 2016*. Mantica, P., Giruzzi, G., Fajardo, M., Gans, T., Poedts, S. & Vennekens, N. (eds.). European Physical Society (EPS), Vol. 40A.

**Modelling of ICRF fast ion generation in 2D and 3D plasma configurations**  
Faustin, J. M., Graves, J. P., Cooper, W. A., Geiger, J. & Pfefferlé, D., 1 Jan 2016, *43rd European Physical Society Conference on Plasma Physics, EPS 2016*. Belgium: European Physical Society (EPS), Vol. 40A.

**Applications of the SCENIC code package to the minority ion-cyclotron heating in wendelstein 7-X plasmas**  
Faustin, J. M., Cooper, W. A., Geiger, J., Graves, J. P. & Pfefferlé, D., 10 Dec 2015, *Radio Frequency Power in Plasmas: Proceedings of the 21st Topical Conference*. American Institute of Physics, Vol. 1689. 060003

**Free boundary equilibrium in 3D tokamaks with toroidal rotation**  
Cooper, W. A., Brunetti, D., Faustin, J. M., Graves, J. P., Pfefferlé, D., Raghunathan, M., Sauter, O., Tran, T. M., Chapman, I. T., Ham, C. J., Aiba, N., The MAST team & JET contributors, 1 Jun 2015, In : Nuclear Fusion. 55, 6, 063032.

**Hybrid guiding-centre/full-orbit simulations in non-axisymmetric magnetic geometry exploiting general criterion for guiding-centre accuracy**  
Pfefferlé, D., Graves, J. P. & Cooper, W. A., 1 May 2015, In : Plasma Physics and Controlled Fusion. 57, 5, 054017.

**Impact of RMP magnetic field simulation models on fast ion losses**  
Pfefferlé, D., Misev, C., Cooper, W. A. & Graves, J. P., 1 Jan 2015, In : Nuclear Fusion. 55, 1, 012001.

**Energetic ion dynamics and confinement in 3D saturated MHD configurations**  
Pfefferle, D., 2015

**VENUS-LEVIS and its spline-Fourier interpolation of 3D toroidal magnetic field representation for guiding-centre and full-orbit simulations of charged energetic particles**  
Pfefferlé, D., Cooper, W. A., Graves, J. P. & Misev, C., 1 Dec 2014, In : Computer Physics Communications. 185, 12, p. 3127-3140 14 p.

**An approximate single fluid 3-dimensional magnetohydrodynamic equilibrium model with toroidal flow**  
Cooper, W. A., Hirshman, S. P., Chapman, I. T., Brunetti, D., Faustin, J. M., Graves, J. P., Pfefferlé, D., Raghunathan, M., Sauter, O., Tran, T. M. & Aiba, N., 1 Sep 2014, In : Plasma Physics and Controlled Fusion. 56, 9, 094004.

**Modeling of ion-cyclotron resonant heating in Wendelstein 7-X equilibrium**  
Faustin, J. M., Cooper, W. A., Graves, J. P. & Pfefferlé, D., 1 Jan 2014, *Proceedings of the Joint Varenna-Lausanne International Workshop on the Theory of Fusion Plasmas 2014*. Garbet, X. & Sauter, O. (eds.). 1 ed. United Kingdom: IOP Publishing, Vol. 561. 012006. (Journal of Physics: Conference Series).

### **NBI fast ion confinement in the helical core of MAST hybrid-like plasmas**

Pfefferlé, D., Graves, J. P., Cooper, W. A., Misev, C., Chapman, I. T., Turnyanskiy, M. & Sangaroon, S., 1 Jan 2014, In : Nuclear Fusion. 54, 6, 064020.

### **Bifurcated helical core equilibrium states in tokamaks**

Cooper, W. A., Chapman, I. T., Schmitz, O., Turnbull, A. D., Tobias, B. J., Lazarus, E. A., Turco, F., Lanctot, M. J., Evans, T. E., Graves, J. P., Brunetti, D., Pfefferlé, D., Reimerdes, H., Sauter, O., Halpern, F. D., Tran, T. M., Coda, S., Duval, B. P., Labit, B., Pochelon, A. & 11 others, Turnyanskiy, M. R., Lao, L., Luce, T. C., Buttery, R., Ferron, J. R., Hollmann, E. M., Petty, C. C., Van Zeeland, M., Fenstermacher, M. E., Hanson, J. M. & Lütjens, H., 1 Jul 2013, In : Nuclear Fusion. 53, 7, 073021.

### **Tokamak MHD equilibria with 3D distortions**

Cooper, W. A., Brunetti, D., Graves, J. P., Misev, C., Pfefferlé, D., Sauter, O., Tran, T. M., Chapman, I. T. & Lazerson, S. A., 1 Jan 2013, *40th EPS Conference on Plasma Physics, EPS 2013*. European Physical Society (EPS), Vol. 2. p. 986-989 4 p.

### **Exploitation of a general-coordinate guiding centre code for the redistribution of fast ions in deformed hybrid tokamak equilibria**

Pfefferlé, D., Graves, J. P. & Cooper, W. A., 1 Dec 2012, *Proceedings of the Joint Varenna-Lausanne International Workshop on Theory of Fusion Plasmas 2012*. Garbet, X. & Sauter, O. (eds.). 1 ed. United Kingdom: IOP Publishing, Vol. 401. 012020. (Journal of Physics: Conference Series).

## **Teaching units (UWA)**

### **Introduction to Applied Mathematics**

David Pfefferle  
24/02/20 → ...

### **Mathematics Foundations: Specialist**

David Pfefferle  
27/08/18 → ...

### **Multivariable Calculus**

David Pfefferle & Miccal Matthews  
19/02/18 → ...

### **Scientific and Industrial Modelling**

David Pfefferle & Neville Fowkes  
30/07/18 → ...