Jeremy M. Hanson

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Education

Ph. D. Applied Physics, May 2009.
Columbia University (New York, NY)

Advisor: Professor Gerald A. Navratil

Thesis: "A Kalman Filter for Active Feedback on Rotating External Kink Instabilities in a Tokamak Plasma"

M. S. Applied Physics, May 2005.
Columbia University (New York, NY)

B. S. Applied Mathematics, Engineering, and Physics, May 2004.
University of Wisconsin-Madison (Madison, WI)

Experience

Department of Applied Physics & Applied Mathematics - Columbia University
Research Assistant, High Beta Tokamak-Extended Pulse experiment, June 2005–present.

- Created tokamak plasmas.
- Designed and implemented a Kalman filter feedback algorithm for control of plasma instabilities.
- Assisted with administration of Linux and VMS data-acquisition and analysis servers.
- Presented research results at American Physical Society meetings.

Teaching Assistant, Computational Maths and Physics, January 2005–May 2005.
Teaching Assistant, Applied Linear Algebra, September 2004–December 2004.

- Assisted students attempting to understand course material.
- Proctored written examinations.
- Generated solution sets for weekly assignments.
- Corrected assignments and exams; tabulated grades.

UW-Madison Plasma Physics Group
Lab Hourly, January 2001–August 2004.

- Planned and executed mechanical and electrical tasks related to lab setup and operation.
- Developed machine tool and rough carpentry skills.
- Wound large inductor coils.
- Assisted in maintenance and assembly of pulse forming networks.

Computer Skills

- C, HTML, IDL, ImageMagick, LaTeX, MDSplus, NI LabVIEW, Unix/Linux, VMS.

Peer-reviewed Journal Publications

J. M. Hanson, B. DeBono, R. W. James, J. P. Levesque, M. E. Mauel, D. A. Maurer, G. A. Navratil, T. Sunn Pedersen, D. Shiraki, "A Kalman filter for feedback control of rotating external kink instabilities in the presence of noise," *Physics of Plasmas* **16**, 056112 (2009).

J. M. Hanson, A. J. Klein, M. E. Mauel, D. A. Maurer, G. A. Navratil, and T. Sunn Pedersen, "A digital control system for external magnetohydrodynamic modes in tokamak plasmas," *Review of Scientific Instruments* **80**, 043503 (2009).

J. M. Hanson, B. DeBono, R. W. James, J. P. Levesque, M. E. Mauel, D. A. Maurer, G. A. Navratil, T. Sunn Pedersen, D. Shiraki, "Feedback suppression of rotating external kink instabilities in the presence of noise," *Physics of Plasmas* **15**, 080704 (2008).

T. Sunn Pedersen, D. A. Maurer, J. Bialek, O. Katsuro-Hopkins, J. M. Hanson, M. E. Mauel, R. James, Y. Liu and G. A. Navratil, "Experiments and modelling of external kink mode control using modular internal feedback coils ", *Nuclear Fusion* **47**, 1293–1299 (2007).

Presentations

"Feedback Control of Rotating External Kink Modes using a Kalman Filter." Talk given for the University of Wisconsin–Madison Plasma Physics Seminar, 26 January 2009.

"External Kink Mode Feedback: Analysis and Results," *Bull. Amer. Phys. Soc.* Paper JP6.00105 (2008). Poster presented at the 50^{th} annual meeting of the Division of Plasma Physics in Dallas, TX on Nov 18, 2008.

"Feedback Suppression of Rotating External Kink Modes in the Presence of Noise," *Bull. Amer. Phys. Soc.* Paper BI2.00004 (2008). Invited talk given at the 50^{th} annual meeting of the Division of Plasma Physics in Dallas, TX on Nov 17, 2008.

"A Kalman filter for active feedback on rotating external kink instabilities in a tokamak plasma." Talk given at the Workshop on Active Control of MHD Stability at Columbia University, New York, NY on Nov 18, 2007.

"A Kalman Filter for Feedback Control of Rotating External Kink Instabilities in a Tokamak Plasma", *Bull. Amer. Phys. Soc.* Paper PP8.00133 (2007). Poster presented at the 49^{th} annual meeting of the Division of Plasma Physics, Orlando, FL

"Using a Kalman Filter During Active Feedback of External Kink Modes in HBT-EP," *Bull. Amer. Phys. Soc.* Paper NP1.00019 (2006). Poster presented at the 48^{th} annual meeting of the Division of Plasma Physics, Philadelphia, PA

"Computational Modeling of the HBT-EP ICRF Heating System," *Bull. Amer. Phys. Soc.* Paper BP1.00008 (2005). Poster presented at the 47^{th} annual meeting of the Division of Plasma Physics, Denver, CO.

Honors

Extraordinary Teaching Assistant Award, December 2005.
Awarded for exceptional effort as a teaching assistant and excellence in undergraduate education. (School of Engineering and Applied Science, Columbia University)

AMEP Leadership Prize, May 2004.
Awarded yearly to outstanding students pursuing a degree in Applied Mathematics, Engineering, and Physics (AMEP). (University of Wisconsin–Madison)