Matthew M. Peet, curriculum vitae

CONTACT INFORMATION

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RESEARCH INTERESTS

I am interested in the rigorous application of mathematical principles to difficult problems in control theory and its applications. Specific areas of interest include but are not limited to stability and control of linear and nonlinear differential equations with delay, distributed dynamical systems and networked communication systems, Internet Congestion Control, and biological systems.

EDUCATION

Stanford University, Stanford, California USA

Ph.D. Candidate, Aeronautics and Astronautics (expected graduation: March 2006)

- Dissertation Topic: "Stability and Control of Nonlinear Differential Equations with Delay"
- Advisor: Sanjay Lall

Stanford University, Stanford, California USA

M.S., Aeronautics and Astronautics, June, 2001

University of Texas at Austin, Austin, Texas USA

B.S., Aerospace Engineering, December, 1999
B.S., Physics, December, 1999

RESEARCH EXPERIENCE

Networked Systems and Controls Laboratory, Stanford, California USA **2002 - present**
Stanford University Advisor: Sanjay Lall
Graduate Student
Performed research on the stability of proposed Internet congestion control protocols. Showed that in certain cases global stability holds under the same conditions as linear stability. Derived two new forms of refutation that can be used to prove positivity of Lyapunov functionals. Showed how these refutations can be parameterized using the space of positive semidefinite matrices. Used the parameterizations to develop computational algorithms for the stability analysis of nonlinear delay-differential equations defined by polynomials.

SNAP project, Berkeley, California USA **2000 - 2001**
Lawrence Berkeley National Laboratory
Research Assistant
Assisted with mission planning for the Supernova/Acceleration Probe(SNAP). Worked on an algorithm for the construction of lunar gravity assist trajectories for possible application to SNAP. Presented results at project review meetings.

Gravity Probe B, Stanford, California USA **2000 - 2001**
Stanford University
Research Assistant
Performed analysis of GPS satellites to determine optimal antenna configuration given current satellite constellation. Presented results to conference of GPS III contractors in Phoenix. Participated in GPS III antenna design based on this analysis.

Johnston Space Center, Clear Lake, Texas USA **1998 - 1999**
Lockheed Martin Space Operations Corp. Flight Dynamics Planning and Analysis Group
Applications Engineer
Developed flight dynamics software for the International Space Station. Developed orbital dynamics simulators using ADA and MatrixX. Developed Graphical interfaces using GPip and PVWave.

Participated in design review and inspection process. Developed and implemented physical system modeling techniques. Worked with users to ensure correct implementation of software. Oversaw testing and implementation of software.

Applied Research Laboratories, Austin, Texas USA **1997 - 1998**
Department of Defense
Research Assistant
Worked as a data analyst in the evaluation of GPS systems in support of the fleet ballistic missile program. Interpreted data from GPS systems used for impact detection during ballistic missile tests. Participated in the design of GPS systems used for the evaluation of ballistic missile tests. Assisted in the computer modeling of hardware system designs. Performed technical writing concerning design analysis and testing results.

Fusion Research Center, Austin, Texas USA **1996 - 1997**
University of Texas at Austin
Research Engineer
Participated in the design of equipment for experimental nuclear fusion research. Retrieved and processed Experimental data. Conducted computer aided design and modeling of conceptual experimental equipment

Journal Publications

A. Papachristodoulou, M. M Peet and S. Lall *Analysis of Nonlinear Time-Delay Systems Using the Sum of Squares Decomposition.* preprint.

M. M. Peet, A. Papachristodoulou and S. Lall. *Stability Analysis of Linear Time-Delay Systems using Semidefinite Programming.* Submitted to Automatica, January 2006.

M. M. Peet and S. Lall. *A Result on Global Stability of Internet Congestion Control.* Submitted to IEEE Transactions on Automatic Control, January 2005.

Conference Publications

M. M. Peet, A. Papachristodoulou and S. Lall. *Stability Analysis of Linear Time-Delay Systems using Semidefinite Programming.* preprint.

A. Papachristodoulou, M. M. Peet and S. Lall. *Constructing Lyapunov-Krasovskii Functionals for Linear Time Delay Systems.* Proceedings of the American Control Conference, pp. 2845-2850, June 2005.

M. M. Peet and S. Lall. *On Global Stability of Internet Congestion Control.* Proceedings of the 43rd IEEE Conference on Decision and Control(CDC), pp. 1035-1041, December 2004.

M. M. Peet and S. Lall. *Constructing Lyapunov Functions for Delay-Differential Equations using Semidefinite Programming.* Proceedings of the 6th IFAC Symposium on Nonlinear Control Systems(NOLCOS), pp. 381-381, August 2004.

Conference Presentations

Constructing Lyapunov-Krasovskii Functionals for Linear Time Delay Systems. American Control Conference. June 2005.

Computing Stability of Time-Delay Systems. Seagull Technology Invited Seminar. May, 2005

Computing Stability of Time-Delay Systems. Stanford Aerospace Affiliates. April, 2005

On Global Stability of Internet Congestion. IEEE Conference on Decision and Control(CDC). December 2004.

Constructing Lyapunov Functions for Nonlinear Delay-Differential Equations using Semidefinite Programming. IFAC Symposium on Nonlinear Control Systems(NOLCOS). August 2004.

Internet Congestion Control. Stanford Aerospace Affiliates. April, 2004.

Professional References

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further references available upon request

Professional Activities

- Reviewer: IEEE Transactions on Automatic Control, Automatica, IEEE/CSS Conference on Decision and Control, American Control Conference
- student member: IEEE

Technical Skills and Experience

- Mathematical Programming Languages: Matlab, Mathematica
- Optimization Software and Parsers: SeDuMi, LMILab, YALMIP, SOStools, SOScode
- Programming Languages: C, Ada, Fortran
- Physical Modeling Tools: AutoCad, NASTRAN
- Mission Planning and Analysis Software: STK, Princeton Satellite Toolbox
- Operating Systems: Unix/Linux, Windows.
- Foreign Languages: native English, conversational Russian, survival German

Honors and Awards

- Boeing Graduate Fellowship Recipient, 2000
- Graduated Cum Laude from University of Texas at Austin, 1999
- ΣΓΤ Aerospace Engineering Honors Society, 1997
- Friends of Alec merit scholarship recipient, 1994
- Dedman merit scholarship recipient, 1994
- National Merit Scholar, 1994