



**The Center for Control, Dynamical Systems, and Computation
University of California at Santa Barbara
Spring 2008 Seminar Series
Presents**

An Asymptotic Analysis of Random Lyapunov and Riccati Recursions

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Abstract:

Lyapunov and Riccati recursions frequently arise in estimation and control. In adaptive filtering, as well as in problems of distributed estimation and control over lossy networks, the resulting recursions have coefficient matrices that are drawn randomly from some distribution. In such situations the solution to the recursions form a matrix-valued random process, which makes the stability and convergence analysis (which is necessary to evaluate the performance of the underlying estimators and controllers) quite challenging. Motivated by recent results in large random matrix theory, in particular the transform techniques pioneered by Marcenko and Pastur, we present a general approach to studying the asymptotic eigen distribution of the solution to random Lyapunov and Riccati recursions. In quite a few cases the approach provides a complete solution, whereas in others there remain open issues. This talk will provide a survey of applications where such random recursions arise, a review of the relevant random matrix theory, a description of our new results and their implications, and finally propose some open problems and directions for future work.

About the Speaker:

Babak Hassibi was born in Tehran, Iran, in 1967. He received the B.S. degree from the University of Tehran in 1989, and the M.S. and Ph.D. degrees from Stanford University in 1993 and 1996, respectively, all in electrical engineering. From October 1996 to October 1998 he was a research associate at the Information Systems Laboratory, Stanford University, and from November 1998 to December 2000 he was a Member of the Technical Staff in the Mathematical Sciences Research Center at Bell Laboratories, Murray Hill, NJ. Since January 2001 he has been with the California Institute of Technology, Pasadena, CA, where he is currently professor of electrical engineering. He has also held short-term appointments at Ricoh California Research Center, the Indian Institute of Science, and Linkoping University, Sweden. His research interests include wireless communications, robust estimation and control, adaptive signal processing and linear algebra. He is a recipient of an Alborz Foundation Fellowship, the 1999 O. Hugo Schuck best paper award of the American Automatic Control Council, the 2002 National Science Foundation Career Award, the 2002 Okawa Foundation Research Grant for Information and Telecommunications, the 2003 David and Lucille Packard Fellowship for Science and Engineering and the 2003 Presidential Early Career Award for Scientists and Engineers (PECASE), and was a participant in the 2004 National Academy of Engineering "Frontiers in Engineering" program.