

# INSTITUTE FOR MATHEMATICS AND ITS APPLICATIONS

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The IMA was founded by and receives major support from the National Science Foundation.

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## IMA NEWSLETTER # 315

December 1–December 31, 2002

2002–2003 Program

### OPTIMIZATION

See <http://www.ima.umn.edu/optimization/> for a full description of the 2002–2003 program on Optimization.

IMA schedules are subject to revision, particularly during workshops. See

<http://www.ima.umn.edu/~seminar/sched> and

<http://www.ima.umn.edu/newsletters/> for the latest scheduling information.

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<b>PART I: NEWS AND NOTES</b>
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#### Board of Governors

On 31 December 2002, four members of the current Board of Governors will complete their terms: Fan Chung Graham (UCSD), Joan Feigenbaum (Yale), Charles Gear (NEC) and Jim Yorke (University of Maryland).

We thank them for their service to the IMA.

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PARTICIPATING INSTITUTIONS: Centrum voor Wiskunde en Informatica (CWI), Consiglio Nazionale delle Ricerche, Georgia Institute of Technology, Indiana University, Iowa State University, Kent State University, Los Alamos National Laboratory, Michigan State University, Mississippi State University, Northern Illinois University, Ohio State University, Pennsylvania State University, Purdue University, Sandia National Laboratories, Seoul National University (BK21 Math-SNU), Seoul National University (SRCCS), Texas A&M University, University of Chicago, University of Cincinnati, University of Delaware, University of Houston, University of Illinois (Urbana), University of Iowa, University of Kentucky, University of Maryland, University of Michigan, University of Minnesota, University of Notre Dame, University of Pittsburgh, University of Wisconsin, University of Wyoming, Wayne State University.

PARTICIPATING CORPORATIONS: Boeing, Ford, General Motors, Honeywell, IBM, Lockheed Martin, Lucent, Motorola, Schlumberger, Siemens, Telcordia Technologies, 3M.

Version of January 9, 2003

**IMA "Hot Topics" Workshop:  
Data-driven Control and Optimization**

4-6 December 2002

Organizers: S. Massoud Amin (Electric Power Research Institute),  
George Cybenko (Dartmouth College),  
Rudolf Kulhavy (Honeywell Laboratories),  
Tariq Samad (Honeywell Laboratories)

See <http://www.ima.umn.edu/optimization/fall/data-driven.html>

**IMA Workshop:  
Distribution Systems: Location and Vehicle Routing**

2-6 December 2002

Organizers: Michel Gendreau (Université/ de Montréal),  
Gilbert Laporte (Université de Montréal)

See <http://www.ima.umn.edu/optimization/fall/distribution.html>

**IMA Website**

Comments or suggestions concerning the IMA website may be addressed to

[webmaster@ima.umn.edu](mailto:webmaster@ima.umn.edu).

In particular, we appreciate any information about World-Wide Web links appropriate to current and upcoming IMA programs.

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**PART II: SCHEDULE FOR DECEMBER 1-DECEMBER 31, 2002**

**Monday, December 2**

The 3:00 pm IMA break will be in Lind Hall 400.  
Hosted by Dan Kern.

**Tuesday, December 3**

The 10:30 IMA break will be in Lind Hall 400.

**IMA POSTDOC SEMINAR, Lind Hall 409:**

11:15-12:15

**Maurice Queyranne**  
University of British Columbia

On Optimum Size-Constrained Set Partitions with Sub-modular Costs

*Abstract:* Given a finite set  $N$ , a function  $f$  associating a cost  $f(S)$  to each subset  $S$  of  $N$ , and integers  $h$  and  $k$ , we consider the problem of finding a partition of  $N$  into at least  $h$  and at most  $k$  nonempty parts  $S_1, \dots, S_m$ , and with minimum total cost  $f(S_1) + \dots + f(S_m)$ . Such problems arise in VLSI design (netlist partitioning), clustering, statistical mechanics (the Potts model of spin systems), network design, and graph connectivity. When the cost function  $f$  is submodular, we identify important cases that can be solved to optimality in polynomial time in the value oracle model. We also present a simple approximation algorithm with a performance guarantee better than 2 for the case when  $f$  is also symmetric (i.e., every subset has the same cost as its complement, as happens with network and hypergraph cuts). This approximation algorithm is purely combinatorial and uses  $O(|N|^4)$  oracle calls. Its analysis relies on the existence of cut trees (aka Gomory-Hu trees) for symmetric submodular set functions. Some of the results presented in this talk extend to general (symmetric) submodular functions earlier results known only for network cut functions.

The IMA Postdoc Seminar is organized by M. Yvonne Ou and Olga Brezhneva.

**Wednesday, December 4**

**IMA “Hot Topics” Workshop:  
Data-driven Control and Optimization**

4–6 December 2002

Organizers: S. Massoud Amin (Electric Power Research Institute),  
George Cybenko (Dartmouth College),  
Rudolf Kulhavy (Honeywell Laboratories),  
Tariq Samad (Honeywell Laboratories)

See <http://www.ima.umn.edu/optimization/fall/data-driven.html>

**All talks are in Lecture Hall EE/CS 3-180 unless otherwise noted.**

8:30	<b>Coffee and Registration</b>	Reception Room EE/CS 3-176
9:15-9:30	<b>Douglas N. Arnold, Scot Adams and Organizers</b>	Welcome and Introduction
9:30-10:20	<b>Steve Smale</b> University of California, Berkeley	Fast Algorithms for Dealing with Data and Understanding Them

*Abstract:* Recent developments in learning theory help to broaden and deepen methods for analysing data. Non-linear algorithms get replaced by linear ones in high dimensional spaces.

10:20-10:30	<b>Discussion</b>	
10:30-11:00	<b>Coffee Break</b>	Reception Room EE/CS 3-176
11:00-11:50	<b>Arthur Kordon</b> Dow Chemical Company	Hybrid Intelligent Systems for Data-Driven Monitoring and Optimization

*Abstract:* A novel approach for data-driven modeling based on integration of four key computational intelligence approaches (genetic programming, analytical neural networks, support vector machines, and particle swarm optimizers) is proposed. The integrated methodology amplifies the advantages of the individual techniques, significantly reduces the development time, and delivers robust empirical models with low maintenance cost. The advantages of the proposed methodology for data-driven monitoring and optimization will be illustrated with several successful applications in The Dow Chemical Company.

11:50-12:00      **Discussion**

12:00-1:30      **Lunch Break**

1:30-2:20      **Steffen Lauritzen**      LIMIDs - Representing and Solving Decision Problems  
Aalborg University      with Limited Information

*Abstract:* The notion of a Limited Memory Influence Diagram (LIMID) is introduced as a Bayesian network augmented with nodes representing decisions and utility functions. For each decision it is specified what information is available at the time when the decision is to be made. In contrast with traditional influence diagrams, the assumption of no forgetting is relaxed, and there is no additional constraints on the order in which decisions are to be taken. This allows for multiple decision makers and decision makers with limited memory, and reduces complexity of strategies. We give a local computation algorithm for finding locally optimal policies, conditions for the policies to be globally optimal, and indicate how this can be exploited to obtain bounds for the loss of utility, for example in partially observed Markov decision processes (POMDPs). The lecture is largely based upon:

Lauritzen, S.L. and Nilsson, D. (2001). Representing and Solving Decision Problems with Limited Information, *Management Science*, 47, 1238-1251.

Can be obtained from <http://www.math.auc.dk/~steffen/papers/limids.pdf>

2:20-2:30      **Discussion**

2:30-2:40      **Coffee Break**      Reception Room EE/CS 3-176

2:40-3:30      **Gregory Piatetsky-Shapiro**      Knowledge Discovery in Microarray Gene Expression  
KDnuggets      Data

*Abstract:* DNA Microarrays are revolutionizing molecular biology, allowing simultaneous analysis of many thousands of genes. Microarray hold the promise of important applications, including creating novel, genetic-based diagnostic tests, finding new molecular targets for therapy, and developing personalized treatments.

Microarrays allow analysis of dynamic processes and deeper insight into biological pathways.

However, the large number of genes and a typically small number of samples, present unique challenges for DNA microarray data analysis. We discuss issues in normalization of microarray data, selecting the best set of genes for classification and clustering, randomization techniques, and building classification and clustering models.

We illustrate these processes using a number of software tools and show new results with potential biological significance.

3:30-3:40      **Discussion**

3:40      **IMA Tea/Poster Session**      IMA East, 400 Lind Hall

Posters presented in IMA East, 400 Lind Hall:

3:40                    **Maria Prandini**                    Cautious Hierarchical Switching Control of Stochastic  
University of Brescia, Italy                    Linear Systems

*Abstract:* We address the problem of controlling an unknown stochastic linear system and propose a new methodology that incorporates the advantages of cautious stochastic control and switching control in a hierarchical scheme. The design of cautious switching controllers is based on the following two-step procedure: i) a probability measure describing the likelihood of different models is updated on-line based on observations; and ii) at each switching time, the controller in the candidate controller set that optimizes a certain average control cost with respect to the updated probability measure is selected. If a certain structured set of candidate controllers is used in the above cautious switching scheme, then a controller is automatically chosen that suitably compromises performance against robustness. Randomized algorithms are used to make the controller selection computationally tractable.

This is a joint work with M.C. Campi and J.P. Hespanha.

**Thursday, December 5**

9:00-9:30            **Coffee**                                    Reception Room EE/CS 3-176

9:30-10:20        **Joe Chow**                                Optimization and Risk Management in Open-Access  
Rensselaer Polytechnic Institute            Electric Energy Markets

*Abstract:* In an open-access electric energy market, electricity suppliers and load serving entities are allowed to trade energy and provide bids into a daily energy market. The power system is managed by an independent system operator, who usually has the role of administrating the energy market as well. Suppliers and loads need to optimize their expected energy position as well as any real-time variation, under a limited information structure imposed by the independent system operator. Thus the optimization has to be based on past data predicting future market conditions. The talk will provide an overview of open-access electric energy markets as well as some research on optimal bidding strategies by Ning Lu, a PhD candidate at RPI.

10:20-10:30        **Discussion**

10:30-10:40        **Coffee Break**                            Reception Room EE/CS 3-176

10:40-11:30        **Bruce Wollenberg**                    Solving the ISO “Seams” Problem for Uniform Boundary  
Dept. of Electrical and Comp. Eng., U of    LMP’s  
Minnesota

*Abstract:* The US Department of Energy, Federal Energy Regulators Commission, has released a Standard Market Design (SMD) which introduces the problem of enabling two Independent System Operators (ISO’s) which independently calculate the market clearing prices for their respective markets to reach consistent Locational Marginal Prices (LMP’s) along a shared boundary. Without consistent LMP’s trading across a boundary (seam) can be difficult or impossible. This presentation will focus on the issue of enabling two ISO’s to reach a common set of LMP’s on the boundary. William Hogan has presented some preliminary work toward a solution wherein multiple ISO’s solutions are iterated until a common solution is reached. In Hogan’s work, only transmission limit constraints were imposed on the solution. We have extended this to include first contingency constraints as well. The market clearing calculations are done with an Optimal Power Flow (OPF) based on a full Alternating Current model of the power system. The LMP’s are the bus power constraint Lagrange multipliers from the solution. Both Hogan’s and our own work so far have been with linear networks not with full AC OPF solutions and full AC contingency analysis. The talk will explore many of the difficulties of achieving a common

boundary bus LMP when each ISO is using an AC OPF and AC contingency analysis to calculate the LMP's and what research directions we see as promising. The aim of the work we are conducting is to achieve tools for ISO's to enable them to continue to operate independently yet to have uniform LMP's along the boundaries with other ISO's.

11:30-11:40      **Discussion**

11:40-12:40      **Lunch Break**

12:40-1:10      **Jay Lee**      Simulation Based Approximation of Value Function for  
Georgia Tech      Process Control

*Abstract:* Although model predictive control (MPC) has firmly etched itself in process control practice, its large on-line computational demand and inability to rigorously consider information feedback under uncertainty limits its usage in complex systems, which are characterized by multi-scale, nonlinear, hybrid dynamics and significant uncertainties. In this talk, we propose an alternative approach based on the infinite horizon cost-to-go (the 'value function'). The key issue lies in obtaining an accurate approximation of the value function for the relevant regions of state space. We propose to build an approximation using simulation data and improve it iteratively through policy or value iteration and additional simulation. We demonstrate the efficacy of the approach on two different bioreactor optimal control problems. Along the way, we also point out some critical issues and outstanding theoretical problems.

1:10-1:20      **Discussion**

1:20-1:50      **Massoud Amin**      Impact of Data-based Modeling on Electricity Infrastruc-  
Electric Power Research Institute      ture Operations and Security Applications

1:50-2:00      **Discussion**

2:00-2:10      **Coffee Break**      Reception Room EE/CS 3-176

2:10-2:40      **Rudolf Kulhavy**      Data-driven Decision-making: The Good, the Bad, and  
Honeywell      the Ugly

*Abstract:* The overwhelming amount of data stored in databases gives sometimes rise to exaggerated expectations. One of the popular myths is that a large amount of data carries necessarily a large amount of information. It is clearly not so; data stored in databases is often redundant or showing just a couple of patterns from the multitude of all possible patterns of the process behavior. Very rarely the data collected is the result of a planned experiment, rather it is a series of snapshots of routine operation. What is so exciting then about the massive data sets available to us today? It is not that a huge amount of data can replace the domain knowledge and the art of modeling. It is that for the first time we have the whole process history at disposal to make decisions affecting the future behavior. This makes database-centric decision-making an exciting alternative to the current paradigms. The presentation discusses opportunities and challenges presented by the new paradigm. Special attention is paid to selection of a "data cube" capturing multi-dimensional data, definition of "similar" historical data points, and similarity search in high-dimensional spaces, while sharing experience from real-life applications of data-centric decision support systems.

2:40-2:50      **Discussion**

2:50-3:30      **George Cybenko**      Dynamic Dynamical Systems  
Dartmouth College

*Abstract:* A new class of control problems are emerging in which the state space of the system changes dynamically. This presents two novel challenges: how to dynamically define these changes and; how to develop effective controls for dealing with systems that dynamically change. This talk will present examples and ongoing work to address both challenges.

3:20-3:30      **Discussion**

3:30-4:00      **Joao Hespanha**      Complexity issues in probabilistic mapping  
University of California, Santa Barbara

*Abstract:* This talk addresses the issue of estimating the positions of a group of objects using a stream of noisy sensor measurements. This is often called probabilistic mapping. From a formal point of view, probabilistic maps are just the probability densities of object positions, conditioned to the available sensor measurements. In this talk we will explore issues related to the computational complexity of constructing probabilistic maps and also utilizing them in the context of path planning.

4:00-4:10      **Discussion**

4:10-4:20      **Coffee Break**      Reception Room EE/CS 3-176

4:20-5:00      **Panel Discussion**      Academic/Industry Collaboration on Data-Centric Methods and Applications  
**Moderator: Massoud Amin**

**Panelists:** Tariq Samad, Vladimir Cherkassky, Arthur Kordon, George Cybenko, Rudolf Kulhavy

6:30      **Workshop Dinner**      Gardens of Salonica, 19 5th St NE, Minneapolis

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**APPL. MATH. AND NUM. ANALYSIS SEMINAR, Vincent Hall 570:**

11:30-12:15      **Bagisa Mukherjee**      Some Mathematical Issues in Liquid Crystal Flows  
Penn State, Scranton

*Abstract:* We will discuss Ericksen's model of liquid crystals with its variable degree of orientation. The model consists of governing equations for the velocity field, the pressure, the director and the order parameter. The constitutive functions for the Leslie coefficients, derived from the molecular theory of Doi, play a crucial role in the modeling. One of the goals of the analysis is to examine the role of the order parameter in describing defects as well as in obtaining new regimes which cannot be predicted by the previous Leslie-Ericksen model.

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**Friday, December 6**

9:00-9:20      **Coffee**      Reception Room EE/CS 3-176

9:20-9:35	<b>Susan Murphy</b> University of Michigan	Dynamic Treatment Regimes for Chronic, Relapsing Disorders
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*Abstract:* The management of chronic, relapsing disorders can be viewed as a control problem in that multi-stage treatment decisions are made with the goal of optimizing mean response. For example, in the prevention of relapse by recovering alcoholics, the response might be percent days abstinent and the treatment decisions might be, which preventative treatment should be used initially, how long should we wait to declare the initial treatment ineffective and switch to a secondary treatment, which secondary treatment should be used, when should treatment be stopped, etc. These treatment decisions would be made on the basis of time varying covariates such as number of days heavy drinking, measures of craving, measures of stress, patient preference and results of urinalyses.

A important open problem in this area is how we might use a batch of data, i.e., a longitudinal sample of individuals for whom both response, covariates and treatment decisions are recorded for each time period, so as to estimate the optimal decision rules. This challenging area is characterized by delayed effects of treatment, an unknown model relating past treatment and covariates to future covariates and a high noise to signal ratio.

9:35-10:35	<b>Daniel Rivera</b> Arizona State University	Model-on-Demand Estimation for Improved Identification and Control of Process Systems
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*Abstract:* In recent years we have been pursuing the concept of nonlinear identification and control through a data-driven framework named Model-on-Demand (MoD). The MoD approach enhances traditional local modeling and provides the potential for performance rivaling global methods (such as NARX models and neural networks) while involving substantially less detailed knowledge of model structure from the user and much more reliable numerical computations.

Research in our laboratory (performed in collaboration with the Division of Automatic Control at Linkoping University, Sweden) has focused on demonstrating the MoD estimation framework as an effective, practical means for modeling and controlling nonlinear process systems. Research topics have included such diverse problems as MoD-based automated smoothing of empirical transfer function estimates (ETFEs), systematic design of databases for MoD estimation using multi-level pseudo-random and minimum crest factor multisine input signals, and the development of a comprehensive MoD-based Predictive Control methodology. A Matlab-based tool for MoD estimation and control, developed in our laboratory in collaboration with Linkoping researchers, is available in the public domain.

The presentation will describe our general experiences with MoD estimation in each of these topical areas. Some pressing challenges and open issues in the application of MoD estimation will be discussed. The talk will conclude with a summary of current activities, among these the application of MoD-based estimation and control to inventory management in supply chains.

10:35-10:55	<b>Coffee Break</b>	Reception Room EE/CS 3-176
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10:55-11:30	<b>Tariq Samad</b> Honeywell, Inc.	Title TBA
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11:30-12:00	<b>Organizers</b>	Concluding remarks
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**Monday, December 9**

The 10:30 IMA break will be in Lind Hall 400.

**OPTIMIZATION SEMINAR, Lind Hall 409:**

11:00-12:00	<b>Dr. Montaz Ali</b> IMA	A review of the stochastic global optimization methods
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*Abstract:* The talk will cover the past and the recent developments, and the new frontiers of global optimization methods. Population set based methods, clustering methods, and the single point based methods will be discussed.

**Tuesday, December 10**

The 10:30 IMA break will be in Lind Hall 400.

**Wednesday, December 11**

The 10:30 IMA break will be in Lind Hall 400.

**BROWN BAG SEMINAR, Lind Hall 409:**

12:00	<b>Maurice Queyranne</b> Univ of BC and IMA	An Introduction to the Competitive Analysis of Online Algorithms
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**Thursday, December 12**

The 10:30 IMA break will be in Lind Hall 400.

APPL. MATH. AND NUM. ANAL. SEMINAR joint with  
COMPUTATIONAL OPTIMIZATION SEMINAR, Lind Hall 409:

11:30-12:15	<b>William Cooper</b> U of Minnesota, Dept. Mech. Eng.	Revenue Management and Markov Decision Processes
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*Abstract:* The talk will begin with a description of the basic revenue management problem, in which a firm must dynamically manage the availability of a variety of products that can be sold for different prices to different customer classes and that are constructed out of a common pool of scarce resources. One important example of such a problem is the fare class management problem faced by commercial airlines, where the resources are seats on flight legs, and the products are possible fare-class/itinerary ticket combinations. The remainder of the talk will describe progress in analyzing these issues using Markov decision processes.

**Friday, December 13**

The 9:40 IMA break will be in Vincent Hall 502.

**IMA/MCIM INDUSTRIAL PROBLEM SEMINAR, 570 Vincent Hall:**

10:10 am	<b>Ann E. DeWitt</b> 3M Research and Development	Mathematics Applied to Biological Systems in Drug Discovery
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*Abstract:* Advances in tools to probe biological phenomena such as combinatorial chemistry, high-throughput screening, genomics and proteomics have, in part, resulted in a rapid rise in the rate at which information is collected. The corresponding increase in the volume of information supplies a rich source for understanding how biological systems operate, but appropriate methods for placing each new piece of information into a larger context must be developed. Certainly mathematics have been applied to the investigation of biological systems in the past, and further opportunities arise from the need to organize and understand vast amounts of information, and to, furthermore, systematically, quantitatively capture behavior for predictive engineering.

This presentation will focus on how mathematics is used as a data analysis and predictive engineering tool to understand biological processes (i.e. life!), including a general introduction to the emerging discipline of “systems biology.” Doctoral research conducted at Massachusetts Institute of Technology will be used for illustration along with examples from current research conducted in 3M Pharmaceuticals.

**Monday, December 16**

The 10:30 IMA break will be in Lind Hall 400.

**Tuesday, December 17**

The 10:30 IMA break will be in Lind Hall 400.

**Wednesday, December 18**

The 10:30 IMA break will be in Lind Hall 400.

**BROWN BAG SEMINAR, Lind Hall 409:**

12:00

**Jing Wang**  
IMA

Approximation Ratio of the Greedy Algorithm to the Set  
Cover Problem

**Thursday, December 19**

The 10:30 IMA break will be in Lind Hall 400.

**Friday, December 20**

The 10:30 IMA break will be in Lind Hall 400.

**Monday, December 23**

A University of Minnesota holiday. IMA offices will be closed.

**Tuesday, December 24**

A University of Minnesota holiday. IMA offices will be closed.

**Wednesday, December 25**

A University of Minnesota holiday. IMA offices will be closed.

**Thursday, December 26**

The 10:30 IMA break will be in Lind Hall 400.

**Friday, December 27**

The 10:30 IMA break will be in Lind Hall 400.

**Monday, December 30**

The 10:30 IMA break will be in Lind Hall 400.

**Tuesday, December 31**

The 10:30 IMA break will be in Lind Hall 400.

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**PART III: CURRENT IMA PARTICIPANTS**

POSTDOCTORAL MEMBERS FOR 2002–2003 PROGRAM YEAR

NAME	PREVIOUS INSTITUTION
Yusuf Bilgin Altundas	Pittsburgh University
Olga Brezhneva	Russian Academy of Sci.
Dacian Daescu	University of Iowa
Gregory S. Duane	University of Colorado
Lisa Evans	Georgia Tech
Balaji Gopalakrishnan	Georgia Tech
Lili Ju	Iowa State University
Herve Kerivin	University Blaise Pascal-France
Daniel Kern	University of Illinois-Chicago
Aurilia Minut	Michigan State University
Haewon Nam	Texas A& M University
M. Yvonne Ou	University of Delaware
Tamon Stephen	University of Michigan
Jing Wang	University of Minnesota
Toshio Yoshikawa	University of Utah
Jun Zhao	Texas A& M University

POSTDOCTORAL MEMBERS IN INDUSTRIAL MATHEMATICS

NAME	PREVIOUS INSTITUTION	INDUSTRIAL AFFILIATION
Yusuf Altundas	University of Pittsburgh	Schlumberger
Lili Ju	Iowa State University	VA Hospital
Aurelia Minut	Michigan State University	3M
Haewon Nam	Texas A & M University	GE
Jun Zhao	Texas A & M University	GE

VISITORS IN RESIDENCE (as of 20 August 2002)

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ADAMS, SCOT	IMA	SEP 1 02 – JUN 30 03
ALI, MONTAZ	Witwatersrand Univ	NOV 1 02 – OCT 31 03
ALLEN, BETH E.	Univ of Minnesota	AUG 15 02 – DEC 31 02
ALTUNDAS, YUSUF BILGIN	IMA	SEP 3 02 – SEP 2 04
AMIN, MASSOUD	EPRI	DEC 3 02 – DEC 6 02
ARNOLD, DOUG N.	IMA	SEP 1 02 – JUN 30 03
ARONSON, DON	IMA	SEP 1 02 – JUN 30 03
BARRON, ANDREW R.	Yale Univ	DEC 5 02 – DEC 6 02
BERHANE, INDRIAS G.	Univ of Kentucky	DEC 3 02 – DEC 8 02
BREZHNEVA, OLGA	IMA	SEP 3 02 – SEP 2 04
CALDERER, M. CARME	Univ of Minnesota	SEP 1 02 – JUN 30 03
CHERKASSKY, VLADIMIR	Univ of Minnesota	DEC 3 02 – DEC 6 02
CHOW, JOE	RPI	DEC 3 02 – DEC 6 02
COULLARD, COLLETTE	Northwestern Univ	SEP 1 02 – JUN 30 03
CYBENKO, GEORGE	Dartmouth College	DEC 3 02 – DEC 6 02
DAESCU, DACIAN	IMA	SEP 1 02 – JUN 30 03
DUANE, GREGORY S.	IMA	SEP 1 02 – JUN 30 03
EFROIMSKY, MICHAEL	IMA	SEP 1 02 – JUN 30 03
EVANS, LISA	IMA	SEP 3 02 – AUG 31 03
GOPALAKRISHNAN, BALAJI	IMA	SEP 3 02 – SEP 2 04
HARP, STEVE	Honeywell Labs	DEC 3 02 – DEC 6 02

HESPANHA, JOAO PEDRO	U Calif-Santa Barbara	DEC 3 02 – DEC 7 02
JU, LILI	IMA	SEP 3 02 – SEP 2 04
KERIVIN, HERVE	IMA	SEP 3 02 – SEP 2 04
KERN, DANIEL	IMA	SEP 1 02 – JUN 30 03
KORDON, ARTHUR	Dow Chemical Company	DEC 3 02 – DEC 8 02
KRYLOV, NICOLAI	Univ of Minnesota	SEP 1 02 – AUG 31 03
KULHAVY, RUDOLF	Honeywell	DEC 2 02 – DEC 8 02
LAURITZEN, STEFFEN	Aalborg Univ	DEC 3 02 – DEC 8 02
LEE, JAY	Georgia Tech	DEC 3 02 – DEC 6 02
LOWENGRUB, JOHN	Univ of Minnesota	SEP 1 02 – JUN 30 03
MENON, SUNIL	Honeywell Labs	DEC 4 02 – DEC 6 02
MINUT, AURELIA	IMA	SEP 1 02 – AUG 31 03
MITTELSTADT, WILLIAM	Bonneville Power Admin	DEC 4 02 – DEC 9 02
MURPHY, SUSAN	Univ of Michigan	DEC 3 02 – DEC 6 02
NAM, HAEWON	IMA	SEP 3 02 – SEP 2 04
NAU, RICHARD	Carleton College	SEP 1 02 – DEC 31 02
NG, PEH	IMA	AUG 1 02 – JUL 31 03
OU, M. YVONNE	IMA	SEP 1 02 – AUG 31 03
PATTERSON, SAMUEL	Carleton College	SEP 28 02 – JUN 30 03
PIATETSKY-SHAPIRO, GREGORY	KDnuggets	DEC 3 02 – DEC 6 02
PRANDINI, MARIA	Univ of Brescia - Italy	DEC 3 02 – DEC 7 02
QUEYRANNE, MAURICE	Univ of BC	SEP 2 02 – DEC 20 02
RIVERA, DANIEL	Arizona State Univ	DEC 3 02 – DEC 6 02
SAMAD, TARIQ	Honeywell, Inc.	DEC 3 02 – DEC 6 02
SANTOSA, FADIL	Univ of Minnesota	SEP 1 02 – JUN 30 03
SENDIL, M. NURI	Northwestern Univ	SEP 2 02 – JUN 30 03
SMALE, STEVE	Univ of Calif-Berkeley	DEC 3 02 – DEC 5 02
STEPHEN, TAMON	IMA	SEP 3 02 – SEP 2 04
SVERAK, VLADIMIR	Univ of Minnesota	SEP 1 02 – AUG 31 03
WANG, JING	IMA	SEP 3 02 – SEP 2 04
WOLLENBERG, BRUCE	Univ of Minnesota	DEC 4 02 – DEC 6 02
YOSHIKAWA, TOSHIO	IMA	SEP 1 02 – JUN 30 03
ZEITOUNI, OFER	Univ of Minnesota	SEP 1 02 – AUG 31 03
ZHAO, JUN	IMA	SEP 3 02 – SEP 2 04

See also URL: <http://www.ima.umn.edu/people/>