INFOMAT

Mai-juni 2016

SIR ANDREW WILES MOTTAR ABELPRISEN FOR 2016 AV HKH HAAKON MAGNUS

INFOMAT kommer ut med 11 nummer i året og gis ut av Norsk Matematisk Forening. Deadline for neste utgave er alltid den 15. i neste måned. Stoff til INFOMAT sendes til

infomat at math.ntnu.no

Foreningen har hjemmeside http://www.matematikkforeningen.no/INFOMAT
Ansvarlig redaktør er Arne B. Sletsjøe, Universitetet i Oslo.

Matematisk kalender

2016:
Juni:
30.-1. juli, *AGMP 2016,* Tromsø
Juli:
18.-22. *7th European Congress of Mathematics (7ECM)*, Berlin
August:
16.-19. Abelsymposiet: *Computation and Combinatorics in Dynamics, Stochastics and Control,* Baroniet Rosendal
Oktober:
19.-20. *MatRICs tredje åskonferanse*, Gardermoen
2017:
Januar:
27.-29. *Ragni Piene 70,* Oslo

AGMP 2016; ALGEBRAIC GEOMETRY AND MATHEMATICAL PHYSICS, Tromsø, 30. juni-1. juli 2016

A conference in honor of Arnfinn Laudal on his 80'th birthday. The conference will take place at the University of Tromsø (Norway), 30th June and 1st July 2016. The conference will cover, but is not limited to, the main themes: Algebra, Geometry, dynamical symmetries and conservation laws, mathematical physics and applications.
http://site.uit.no/agmp/

7TH EUROPEAN CONGRESS OF MATHEMATICS (7ECM), Berlin, 18.-22. juli 2016

http://www.7ecm.de

Abel Symposium 2016

Computation and Combinatorics in Dynamics, Stochastics and Control

August 16-19, 2016
Barony Rosendal
Norway

ABEL PRIZE

MATRICs 3. ÅRSKONFERANSE, Gardermoen, 19.-20. oktober 2016

MatRICs tredje årskonferanse vil holdes på Gardermoen Park Inn 19. – 20. oktober. Konferansen har tema: *Addressing the challenges faced by teachers and learners of university level mathematics*. Hovedforedragsholdere i år blir: Professor Michael Dorff , Chair of the Department of Mathematics, Brigham Young University, Utah, USA. Førstelektor Inger Christin Borge, Matematisk institutt, UiO. Professor Knut Mørken, Matematisk institutt og Institutt for informatikk, UiO. Professor Carl Winsløw, Department of Science Education, University of Copenhagen. Les mer på MatRICs nettside: www.matric.no

Nye doktorgrader

Sindre Tonning Hilden, NTNU forsvarte 26. april 2016 sin avhandling *Upscaling of Water-Flooding Scenarios and Modeling of Polymer Flow* for graden ph.d. Hovedveileder har vært Prof. Helge Holden og medveileder Prof II Knut-Andreas Lie.

Sammendrag:

This thesis considers different aspects of numerical simulations of the fluid flow in petroleum reservoirs. A large part of this work is related to upscaling, which is the process of coarsening a model grid, while maintaining the overall characteristics. Different established upscaling methods for oil-water flow are compared for simulation of field models and their applicability is considered relative to the balance of forces

that govern the fluid flow. New upscaling methods that incorporate a typical force balance are also suggested.
There are different techniques for increasing the amount of oil recovered from a reservoir. One such method, which is considered in this thesis, is polymer flooding, where relatively large polymer molecules are added to the injected water, mainly to increase its viscosity. A methodology for upscaling of polymer parameters is suggested. Also, a method for running polymer simulations more efficiently is presented, where a particular (multi-scale) method is used to solve a part of the problem (the pressure equation) on a coarser scale, meaning there are fewer unknowns. Finally, this work considers a particular aspect of the mathematical model of polymer flow.

Jesper Tveit, UiB forsvarte 2. mai 2016 sin avhandling *A Nonlinear Differential Equation Solver With Potential Application to Pelton Turbines* for graden ph.d.

Sammendrag:

Gasser og væsker, eller fluider som er fellesbetegnelsen, finnes over alt rundt oss. De er ofte bevegelse - noen ganger enkel og forutsigbar bevegelse, andre ganger kaotisk og uforutsigbar bevegelse. I mange tilfeller vil vi gjerne forutsi hvordan fluidene beveger seg. Dette kan være til stor hjelp for eksempel når man designer mekaniske innretninger, som vingene på et fly eller en vannturbin.
Fluidenes bevegelse følger kjente fysiske prinsipp, og ut fra disse prinsippene får vi ett sett med likninger. Disse likningene kalles Navier-Stokes likningene og gir en matematisk beskrivelse av fluidenes bevegelse. Ingen har ennå funnet en generell løsning på Navier-Stokes likningene, kun enkelttilfeller er løst.
Jesper Tveit sin doktorgrad handler om å finne metoder for å løse likninger, som Navier-Stokes likningene, ved hjelp av algoritmer. Algoritmene lar en datamaskin regne seg frem til en løsning for de tilfellene en er interessert i. Denne fremgangsmåten kalles Computational Fluid Dynamics (CFD). CFD-beregninger krever mye datakraft, og det gjelder å finne effektive algoritmer slik at utregningene ikke tar for lang tid.
Avhandlingen presenterer nye algoritmer som potensielt kan brukes til å regne ut strømningsmønstrene som finnes i en vannkraft-turbin. Det fokuseres på Pelton-turbinen, som er spesielt utfordrende matematisk sett. Det vises hvordan algoritmene kan implementeres i form av datakode og hvilke egenskaper de har i forhold til andre algoritmer. Koden blir så anvendt til å løse Navier-Stokes likningene ved ulike tilfeller og resultatet kontrolleres opp i mot kjente løsninger.

M. Sc. **Kristina Rognlien Dahl** ved UiO forsvarte 27. mai 2016 sin avhandling *Information and Memory in Stochastic Optimal Control* for graden ph.d. Veiledere har vært Prof. Bernt Øksendal og Prof. Fred Espen Benth.

Sammendrag:

The world is an uncertain place. Therefore, mathematical models incorporating uncertainty, or stochasticity, have become increasingly important over the last decades. In this thesis, we study such models with the goal of making optimal decisions under uncertainty while incorporating that agents may have different levels of information and memory. Possible applications include optimal trading strategies in finance, minimizing the spreading of viruses and optimal harvesting.
Finance is a field where applications of stochastic analysis are essential. In this thesis, we derive the price of contingent claims (a kind of financial asset) under some general level of partial information. We do this using so-called duality theory, which essentially involves transforming an initial problem to some other related problem which is easier to solve or provides a more informative interpretation of the problem. We also apply a form of duality theory to solve the problem of an agent trying to determine his optimal consumption when his wage is a Lévy process, meaning his wage is a stochastic process which may jump. Such jumps in wage can for instance occur when losing a job.
Determining optimal consumption over time in an uncertain world is an example of a stochastic optimal control problem. A possible way to solve such problems is using stochastic maximum principles. We derive such maximum principles connected to singular recursive utility and

situations where one has noisy memory. Singular recursive utility is an alternative way of measuring total utility, and we consider the situation where the agent can have a singular consumption process. Noisy memory means that the agent has a memory which is slightly disturbed by a Brownian motion.
In order to use the maximum principles to solve the stochastic optimal control problems, we must solve backward stochastic differential equations (BSDEs). Therefore, we have derived existence and uniqueness properties of the BSDEs corresponding to our optimal control problems, as well as solutions of these equations in some special cases.
In general, stochastic differential equations (SDEs) describe the evolution over time of some system with uncertainty. Both SDEs and BSDEs can only be solved analytically in a few special cases. Therefore, one needs numerical methods to approximate solutions. We derive such a numerical method for SDEs involving noisy memory.

Nyheter

NYTT FRA IMU: BREAKOUT GRADUATE FELLOWSHIP PROGRAM

The IMU has recently launched the novel IMU Breakout Graduate Fellowship Program.
Thanks to a generous donation by the winners of the Breakthrough Prizes in Mathematics –
Ian Agol, Simon Donaldson, Maxim Kontsevich, Jacob Lurie, Terence Tao and Richard Taylor – IMU with the assistance of FIMU (Friends of the IMU) and TWAS (The World Academy of Sciences) has launched a fellowship program to support postgraduate studies in a developing country, leading to a PhD degree in the mathematical sciences.
The IMU Breakout Graduate
Fellowships will offer a limited number of grants for excellent students from developing countries. The program will be administered by CDC (Commission for Developing Countries), a commission of IMU.
Professional mathematicians are invited to nominate highly motivated and mathematically talented students from developing countries who plan to complete a doctoral degree in a developing country, including their own home country. Nominees must have a consistently good academic record from the high school level and must be seriously interested in pursuing a career of research and teaching in mathematics.
The deadline for online nominations is 09:00 am CET on 22 June 2016. Please help in making this initiative widely known.

Date: 22 – 23 September 2016
Venue: Scandic Lerkendal Hotel
Organizers: NTNU, NorMathsIn, ECMI
Concept: The goal is to bring together PhD students and faculty members from Norwegian Math departments with industry representatives for a unique blend of exciting events, including among others:
Keynote lectures highlighting challenges and success stories in collaboration between math and industry, both from an academic and industrial perspective.
A math career session, where math PhD students from all Norwegian universities have the chance to present themselves and their achievements to tentative employers from academia and industry.
Information on Norwegian and European funding opportunities for collaboration between math & industry.
A session on math education, to discuss a math curriculum meeting the societal and industrial challenges of the 21st century.
A partnering event of mathematicians and industry representatives.
A further highlight is a science slam for math PhD students moderated by Jo Røislien followed by a joint dinner.