KTH Mechanics

SE-100 44 Stockholm, Sweden

Activity Report 2005

Contents

Preface

This report gives a short overview of the structure and activities at the department of Mechanics, KTH during the year of 2005. More information may be found at the department web site http://www.mech.kth.se.

The teaching activity of the mechanics department during the year of 2005 included basic mechanics courses given for a majority of the students at various schools in KTH. The higher level and graduate courses covered a broad field of subjects within solid and fluid mechanics. The international masters programme in engineering hosted by the department in cooperation with the department of Solid Mechanics was attended by 24 students from 10 countries.

The scientific activity of the department resulted in the defence of 7 doctoral and 8 licentiate thesis during 2005. The publication list of the staff and graduate students of the mechanics department this year amounted to 45 publications in archival journals, 34 publications in conference proceedings and 20 internal reports.

Stockholm, June 2006

Dan Henningson, department chairman

Nicholas Apazidis, department vice chairman

1 Introduction

Department of Mechanics is one of the 6 departments of the School of Science at KTH. The Department had 92 employees and a turnaround of about 63 MSEK during the year of 2005.

Prof. Dan Henningson is the chairman of the department and docent Nicholas Apazidis is the vice chairman. Docent Hanno Essén is the director of undergraduate studies. Functions of the board of the department are now partially executed at the general level of the School of Science. Issues that are specific for the department are discussed and managed by the two groups at the department level. Those are the management group consisting of: Henrik Alfredsson, Gustav Amberg, Nicholas Apazidis, Fritz Bark, Anders Eriksson, Hanno Essén, Dan Hennigson (chairman), Arne Johansson, Hans Silverhag and the administrative group consisting of: Nicholas Apazidis, Dan Hennigson (chairman), Hanno Essén, Erik Lindborg, Arne Nordmark, Hans Silverhag and Ingunn Wester.

The Mechanics department is responsible for a large number of undergraduate and higher level graduate courses, given at almost every school of KTH. These courses cover a wide range of aspects within solid and fluid mechanics.

The department also serves as one of the hosts, together with the Department of Solid Mechanics of the International Masters Programme in Engineering Mechanics which offers a broad spectrum of higher level courses in solid and fluid mechanics. Dr. Jean-Marc Battini serves as the coordinator of this program at the department.

The research activities may be essentially classified into main areas such as "Fluid Mechanics", "Theoretical and Applied mechanics", "Mechanics of Structures" and "Biomechanics".

During the year 2005 the department showed a deficit of 1,5 MSEK. The main reason for the deficit is that 2005 was a final year for a financial support of several research projects, including that of the FAXEN laboratory.

Personnel related matters during 2005

New appointments during 2005

Prof. Henrik Alfredsson served as the department prefect from January 2005 until June 2005.

Prof. Dan Henningson was appointed prefect from July 2005.

Dr Ardishir Hanifi was appointed as adjunct professor.

Dr Elena Gutierrez Farewik was appointed as assistant lecturer.

Dr Galina Shugai was appointed as researcher.

Dr Peter Yakubenko was appointed as researcher.

Senior lecturer Ian Cohen retired in March 2005.

Prof. Martin Lesser retired in May 2005.

During 2005 8 new graduate students started at the department.

Adm Katti Lindfors passed away on January 2, 2005.

Miscellaneous

KTH CICERO (Centre for Internal Combustion Engine Research Opus) is a new competence centre started during 2005 and is devoted to gas management for internal combustion engines. It is initially supported by the Swedish Energy Agency together with the four major vehicle engine manufacturers in Sweden (see www.cicero.kth.se). KTH Mechanics is one of three departments which so far is involved in the centre and prof. Henrik Alfredsson has been appointed its director.

Henrik Alfredsson and Nils Tillmark have during 2005 given a course on compressible flow in exhaust manifolds in cooperation with the division of internal combustion engines.

"Lilla Polhemspriset" for the best Master's thesis in civil engineering education in Sweden during 2005 was awarded to Andreas Andersson and Richard Malm for their Master's thesis at the department of mechanics, KTH. Prof. Anders Ericsson served as the examiner and Prof. Pelle Thomasson as the advisor.

"Design for Performance - Open Lectures in Vehicle Aerodynamics" organized within "Panorama Italia" week during 21–29 April 2005 with the participation of the Italian ambassador and with presentations given by representatives from Ferrari and Ducati. The presentations were given as a result of the successful course in vehicle aerodynamics given by the mechanics department.

The work of Dr. Jens Fransson, Dr. Carlo Cossu, Dr. Luca Brandt and Dr. Alessandro Talamelli on passive reduction of air resistance has attracted attention by Nature (News & Views), the New Scientist, Physical Review Focus, Science et Avenir etc. Within Swedish media the work has appeared in both Rapport (SVT1) and Nyheterna (TV4), which are the two largest news channels in Sweden.

Hanno Essén was coauthor of an anthology that was published in January of 2005: Vetenskap eller villfarelse (Science or Delusion) by Leopard förlag. Hanno's contribution is a chapter called Perpetual motion machines and the dream of free energy. The book is a result of the activity of the society Vetenskap och Folkbildning of which Hanno is vice chairman. The book sold well and got a lot of media visibility. Hanno Essén took part in several seminars and symposia about the book att KVA, KTH, ABF, KTH alumni, etc.

Dr. Boris Jacob, University of Rome, visited KTH Mechanics for a period of four weeks doing experiments in MTL wind tunnel.

Doctoral student Kazuaki Hiwatashi, Department of Aeronautics and Astronautics of the Kyoto University was visiting KTH Mechanics for a period of 1 month conducting experimental work on rotating Couette flow.

Nicholas Apazidis was awarded the F-students award "En fjäder i hatten" for his teaching at the F-programme.

Department meeting combined with a study visit was held towards the end of the spring (June 10th at Vattenfall Utveckling, Älvkarleby). By the end of 2005 the Christmas dinner was arranged at Rosendals Wärdshus, Djurgården.

2 Personnel

Professors

- Henrik Alfredsson, Ph.D. of mechanics, KTH 1983 and Docent there 1985. Professor of fluid physics 1989. Director of KTH CICERO.
- Gustav Amberg, Ph.D. of fluid mechanics, KTH 1986, Docent at KTH 1990. Professor of fluid mechanics 1999. Dean of the school of engineering sciences, since December 1, 2004.
- Fritz Bark, Ph.D. in Applied Mechanics at KTH 1974. Professor of Hydromechanics, 1985. Director of the Faxén Laboratory.
- Anders Eriksson, Ph.D. in steel structures, KTH 1981 and Docent there 1988. Professor of structural mechanics 1992. Vice president of KTH since 1999.
- Dan Henningson. Ph.D. KTH 1988, Docent KTH 1992. Professor of fluid mechanics since 1999 (80% at KTH, 20% at FOI). Department chairman since July 2005. Director of KCSE (KTH Computational Science and Engineering Centre) since July 1, 2004.
- Arne Johansson, Ph.D. in mechanics, KTH 1983 and Docent there 1984. Professor of mechanics 1991. Appointed secretary general for Natural and Engineering Sciences at the Swedish Research Council (VR) since July 1, 2004 (75% at VR, 25% at KTH).
- Martin Lesser, Ph.D. in Aerosp. Eng. at Cornell., Docent and Prof. at LuTH. Professor of mechanics at KTH 1987. Retired in May 2005.

Adjunct professors and guest professor

- Laszlo Fuchs, Ph.D. in Gasdynamics 1977, Docent KTH 1980. Prof. fluid mechanics LTH 1994–present. Guest Prof. (20%) at KTH Mechanics 1994–present.
- Ardeshir Hanifi, Ph.D. in fluid mechanics 1995, Docent KTH 2003. Adj. prof. of fluid mechanics 2005 20%, 80% FOI.
- Per-Olof Thomasson, Ph.D. in 'Ståbyggnad' 1978, Docent KTH 1978. Employed 20% as Adj. Prof. of applied structural mechanics 2002.
- Said Zahrai, Ph.D. in mechanics 1992, Docent KTH 1998, Employed 20% as Adj. Prof. of fluid mechanics at KTH 2002, and 80% at ABB Corp. Res.

Professors emeritii

- Bengt Enflo, Ph.D. and Docent 1965 in theoretical physics, Univ. of Stockholm. 'Biträdande professor' at KTH 1996. Retired in 2000, but still active in research at KTH Mechanics.

- Stig Hjalmars.
- Martin Lesser. Retired in 2005, but still active in research at KTH Mechanics.

Senior Lecturers (in Swedish: lektorer)

- Nicholas Apazidis, Ph.D. in mechanics, KTH 1985, Docent at KTH 1994. Department vice chairman since 2005. Director of graduate studies.
- Anthony Burden, Ph.D. in applied mathematical physics, CTH 1984.
- Ian Cohen, Ph.D. and Docent 1982 in theoretical physics, Univ. of Stockholm. Retired 2005.
- Anders Dahlkild, Ph.D. in mechanics 1988 and Docent 1992 at KTH. Vice director and scientific secretary of the Faxén Laboratory.
- Hanno Essén, Ph.D. in theoretical physics Univ. of Stockholm 1979. Docent 1986. Director of undergraduate studies.
- Richard Hsieh, Ph.D. in mechanics 1978, Docent at KTH 1980.
- Arne Karlsson, TeknL. (50 % at KTH Mechanics.)
- Göran Karlsson, Ph.D. in quantum chemistry 1970 Univ. of Uppsala.
- Erik Lindborg, Ph.D. in Mechanics KTH 1996, Docent at KTH 2001.
- Arne Nordmark. Ph.D. in mechanics 1992. Docent 1999.
- Christer Nyberg, Ph.D. in mechanics 1979 KTH.
- Lars Söderholm, Ph.D. and Docent 1970 in theoretical physics, Univ. of Stockholm.
- Lars Thor, Ph.D. in mechanics at KTH 1973.
- Karl-Erik Thylwe, Ph.D. 1981 in theoretical physics, Univ. of Uppsala. Docent 1987.

Lecturers, research associates and researchers

- Jean-Marc Battini, Ph.D. in Structural mechanics 2002
- Luca Brandt, Ph.D. in Fluid mechanics 2003.
- Geert Brethouwer, Ph.D. in Fluid mechanics, TU Delft 2001.
- Jens Fransson, Ph.D. in Fluid mechanics 2003.
- Elena Gutierrez Farewik, Ph.D. in Orthopedics, KI 2003.
- Fredrik Lundell, Ph.D. in Fluid mechanics 2003.

- Gunnar Maxe ('adjunkt').
- Gunnar Tibert ('forskarassistent'), Ph.D. in Structural mechanics 2002.
- Nils Tillmark, Ph.D. in Fluid mechanics 1995. Responsible for the department's lab. facilities.
- Michael Vynnycky ('förste forskare'), Ph.D. Univ. of Oxford, Docent at KTH 2002.
- Peter Yakubenko ('forskare'), Ph.D. in hydraulic engineering 1996. Researcher, Faxén Laboratory.
- Galina Shugai, Ph.D. 2000 at KTH, Researcher, Faxén Laboratory.

Adjunct Lecturers

- Daniel Söderberg, Ph.D. in fluid mechanics 1999. Adjunct lecturer in fluid mechanics with paper manufacturing application (20% at KTH, 80% at STFI/Packforsk).
- Stefan Wallin, Ph.D. in Fluid Mechanics 2000. Adjunct lecturer in fluid mechanics with turbulence modelling application, (40% at KTH, 60% at FOI).

Guest researchers, post-docs

- *Guest lecturer*: Prof. Alessandro Talamelli, Univ. of Bologna, Italy (3 months)
- *Post-doc*: Dr. Philippe Brunet (Nov 2003–Dec 2005.)
- *Post-doc*: Dr. Olaf Marxen (Apr 2005–June 2006.)
- *Post-doc*: Dr. Philip Schlatter (Sept 2005–Aug 2006.)

Technical and administrative staff

- Lars Bjernerstam
- Pär Ekstrand
- Marcus Gällstedt
- Ulf Landén
- Anne-Mari Olofsson
- Hans Silverhag (administrativ chef)
- Stefan Skult
- Viviana Wallin
- Ingunn Wester (chefsadm./personalansvarig)

Changes in the department personnel during the past 6 years are summarized in the following table

Number of employees during 2000-2005						
Position	2000	2001	2002	2003	2004	2005
Prof./Adj. Prof.	8	9	11	11	10	10
Lect./Adj. Lect.	13	14	15	16	16	16
Ass. lect./Researcher/Adjunct	7	7	7	9	11	12
Adm. personnel	8	9	9	10	10	9
Guest Res./Post-docs				3	5	5
Doctoral students	47	48	45	46	42	38
External doct. stud.	16	14	12	6	11	8
Total	99	101	99	101	105	98

Active graduate students at KTH Mechanics during 2005					
Name	Affiliation	Adv.	Start	TeknL	TeknD
Ahlman Daniel	Mech	AJ/GB	07/2002		
Ahlström Anders	Mech	AE	02/2000	10/2002	04/2005
Byström Martin	Mech	DH	02/2005		
Carlsson Allan	Mech	HAL/DS	01/2005		
Danielsson Carl-Ola	Mech/FLA	AD	01/2001	11/2004	
De Magistris Federica	STFI	AE	02/2000	09/2003	10/2005
Eliasson Veronica	Mech	NA/NT	02/2003	12/2005	
Eriksson Johan	Mech	AN	03/2002	04/2005	
Facciolo Luca	Mech	HAL/NT	06/2001	11/2003	
Fällman Monica	Mech/FLA	FB/DS	04/2003		
Grundestam Olof	Mech	AJ/SW	09/2001	02/2004	
Gårdstam Johannes	KIMAB	AE	07/2003		
Gärdsback Mattias	Mech	AE/GT	03/2004		
Heintz Sofia	Mech	AE/EG	07/2002		
Hellström Fredrik	GM	LF	09/2005		
Herbst Astrid	Mech	DH	03/2001	04/2004	
Hoepffner Jerome	Mech	DH	09/2001	09/2004	
Holm Richard	Mech	GA/DS	09/1999	06/2002	01/2005
Holmqvist Claes	Mech/FLA	AD	10/1999	06/2002	03/2005
Hyensjö Marko	Metso	AD	09/2001	04/2005	
Hällqvist Thomas	Scania	LF	06/2000	05/2003	
Inagaka Kenta	Mech/FLA	SZ/MV	05/2004	11/2005	
Ipek Nulifer	Mech/FLA	MV	11/1997	03/2002	
Ivanell Stefan	Mech/HGO	DH	10/2003	05/2005	
Kaphle Manindra	Mech	AE	01/2005		
Ko Jordan	Mech/FLA	SZ	11/2004	04/2005	
Levin Ori	Mech	DH	06/2000	12/2003	12/2005
Lin Yuan	Mech	GA	01/2004		
Ljubimova Darja	Mech	AE	11/2002	12/2005	
Lögdberg Ola	Scania	HAL/JF	09/2003		
Macchion Olivier	Mech/FLA	SZ	06/2002		06/2005
Marstorp Linus	Mech	AJ/GB	02/2004		
Medici Davide	Mech	HAL	01/2001	03/2004	
Mellgren Niklas	Mech/FLA	MV	05/2003		
Mårtensson Gustaf	Mech/FLA	AJ	05/1999	02/2004	
Nurhussen Filli	Mech	AE	03/2002		
Strömgren Tobias	Mech	GA	04/2005		
Stålberg Erik	Mech	DH/AJ	01/2003	05/2005	
Svärd Anna	GM	HAL/NT	09/2005		
Thomas Michael	Mech	HAL/JF	08/2005		
Törnblom Olle	Mech	AJ	01/2000	01/2003	
Unckel Carl-Gustaf	Mech	DH	10/2004		
Villanueva Walter	Mech	GA	02/2003		
Wright Thomas	Mech	ML	10/1998	12/2001	06/2005
Åkervik Espen	Mech	DH	03/2004		
Örlü Ramis	Mech	HAL/NT	02/2004		

3 Economy

The financial state of the department is summarized i the diagrams shown below.

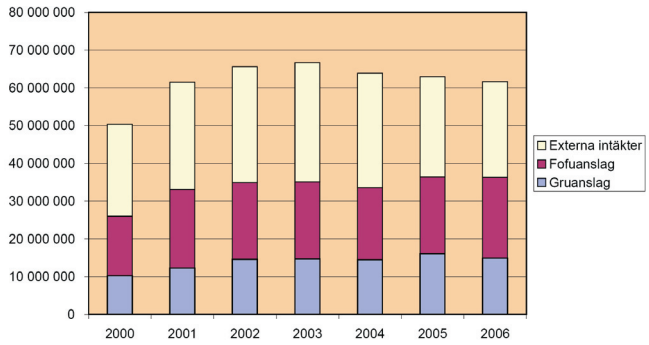

Figure 1: Turnaround during 2000–2006 (projected)

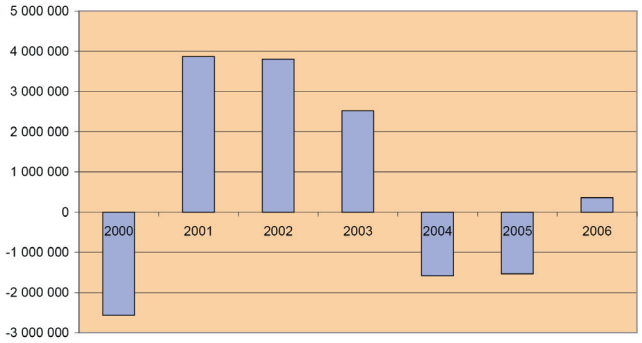

Figure 2: The surplus/deficit during 2000–2006 (projected)

KTH Mekanik

RESULTATRÄKNING 2005 (kr/vh)	GRU	FOFU	Totalt
Gruanslag	16 088 607	0	16 088 607
Fofuanslag	0	20 294 169	20 294 169
Bidrag fr externa finansiärer	0	21 520 165	21 520 165
Övriga intäkter	447 320	4 408 922	4 856 242
Finansiella intäkter	0	209 817	209 817
SUMMA INTÄKTER	***16 535 927***	***46 433 074***	***62 969 001***
Personalkostnader	11 430 605	28 905 250	40 335 855
Lokalkostnader	2 091 879	5 887 481	7 979 360
Resor och traktamenten	97 431	1 694 443	1 791 874
Drift och övrigt	643 214	2 584 752	3 227 966
Gemensamma kostnader	1 950 497	7 656 631	9 607 128
Avskrivningar	27 976	1 477 648	1 505 624
Finansiella kostnader	45 310	13 216	58 526
SUMMA KOSTNADER	***16 286 912***	***48 219 421***	***64 506 333***
ÅRETS KAPITALFÖRÄNDRING	**249 015**	**-1 786 347**	**-1 537 332**

Figure 3: Financial result during 2005

4 Teaching activities

4.1 Undergraduate courses

Basic courses mechanics					
Program	Year	Course code	Credit	Name	Responsible
K, Bio	1	5C1102	4	Mechanics, Smaller course	Lindborg
E	1	5C1102	4	Mechanics, Smaller course	Hsieh
OPEN	1	5C1102	4	Mechanics, Smaller course	Maxe
F	1	5C1103	6	Mechanics, Basic course	Apazidis
VBI	2	5C1103	6	Mechanics, Basic course	Cohen
I	1	5C1103	6	Mechanics, Basic course	Thor
D	2	5C1105	4	Insights in mechanics	Burden
ME	1	5C1106	4	Tillämpad fysik, mekanik	Maxe/Mårtensson
S	2	5C1107	5	Mechanics	Thylwe
F	2	5C1113	4	Mechanics, Continuation course	Apazidis
VBI	2	5C1114	4	Mechanics, Smaller course	Cohen
M, BD	1	5C1130	6	Mechanics I	Hsieh
T	1	5C1130	6	Mechanics I	Nyberg
P	1	5C1130	6	Mechanics I	Maxe
M	2	5C1140	4	Mechanics II	Essén
T	2	5C1140	4	Mechanics II	Nyberg
P	2	5C1130	6	Mechanics II	Maxe
Advanced courses					
All	3	5C1121	4	Analytical mechanics	Essén
All	4	5C1122	4	Continuum mechanics	Söderholm
All	4	5C1123	4	Math. methods of mechanics	Söderholm
All	4	5C1400	5	Nonlinear dynamics	Nordmark
All	4	5C1902	4	Advanced dynamics of complex systems	Thylwe
All	4	5C1904	4	Advanced modern mechanics	Thylwe
Basic courses structural mechanics					
S	3	1C1103	5	Structural mechanics III	Tibert
S	2	1C1109	5	Structural mechanics I	Battini
S	2	1C1115	5	Structural mechanics II	Eriksson
Advanced courses structural mechanics					
All	3	5C1840	5	Structural dynamics	Battini
All	2	5C1850	5	Finite element methods	Eriksson
All	2	5C1860	5	Finite element method modelling	Eriksson
Basic courses fluid mechanics					
T	2	5C1216	4	Thermodynamics	Burden
T	2	5C1217	4	Fluid mechanics	Karlsson
F	3	5C1202	5	Fluid mechanics, Introductory course	Bark
M	3	5C1921	4,5	Fluid mechanics for engineers	Karlsson
Advanced courses fluid mechanics					
All	4	5C1211	4	Vehicle aerodynamics	Talamelli
All	4	5C1212	5	Computational fluid dynamics	Henningson
All	4	5C1213	2	Applied computational fluid dynamics	Wallin

All	3	5C1214	5	Fluid mechanics, General course	Henningson
All	4	5C1215	5	Compressible flow	Alfredsson
All	4	5C1218	5	Turbulence	Burden
All	4	5C1212	5	Advanced compressible flow	HAL, NA, AD, NT

The number of students based on hås/håp: 8*(hås+håp)/2 during the years 2002-2005 is summarized in the following table

Number of students during 2002-2005				
Students	2002	2003	2004	2005
Basic mechanics	1744	1496	1504	1442
Upper level mechanics courses	48	72	96	52
Fluid mechanics	288	408	352	514
Structural mechanics	372	317	262	183

4.2 Master's thesis projects

Master's theses during 2005		
Name	Title	Advisor
Aranki, Josef	Numerical simulations of temperature driven flow in a rotating PCR tube	A. Johansson
Byström, Martin	Optimal disturbances in suction boundary layers	D. Henningson
Espeillac, Pascal	Non Linear Analyses in Low Frequency Dynamics	K-E. Thylwe
Evegren, Philip	Numerical Simulation of Turbulent Blood Flow in an Artificial Heart	S. Zahrai
Hunger, Philipp	Analysis of Pre-activation of Muscles during a Crash Situation	A. Eriksson
Johansson, Lars	Gas Dynamic Properties of a Rocket Jet	A. Dahlkild
Kaphle, Manindra	Dynamics of redundant force systems	A. Eriksson
Kostson, Erik	Rotation-vibration coupling in polyatomic molecules	H. Essén
Lindencrona, Ebba Sjöbäck, Johanna	Load bank design for a phosphoric acid fuel cell stack	M. Vynnycky
Munaretto, Joseph	Methods Using Motion Analysis for Examining the Upper Limb in Children with Hemiplegic Cerebral Palsy	E. Gutierrez-Farewik
Russel Clark, Duncan	Planning of Motion, Considering Continuity Aspects	A. Eriksson
Russel, Colin	Deployment Simulation of Inflatable Tensegrity Frameworks	G. Tibert
Strömgren, Tobias	Implementation of a Flux Corrected Transport Scheme in the Rossby Centre Ocean Model	D. Henningson
Thomas, Michael	Wall shear stress measurements using a pressure fence; theory, experiments, numerics	H. Alfredsson
Thunqvist, Erik	Numerical calculations of flow in a paring tube	A. Dahlkild
Wahlström, Jens	Perfekt böjliga och otänjbara trådar	H. Essén
Yang, Xiofan	Turbulence modelling of separation control by means of vortex generators	A. Johansson

4.3 Graduate courses

During 2005 the following graduate courses ('forskarutbildningskurser') were given. In addition several reading courses were also given.

- 5C5001 General and analytical mechanics (Essén)
- 5C5102 Problems in fluid mechanics (Alfredsson, Amberg)
- 5C5112 Turbulence (Burden)
- 5C5113 Advanced compressible flow (Alfredsson, Apazidis, Dahlkild, Tillmark)
- 5C5114 Numerical methods in fluid mechanics (Henningson)

5 Research activities

5.1 Doctoral theses defended 2005

Richard Holm

Thesis title: Fluid mechanics of fibre suspensions related to papermaking
Date: January 14, 2005
Faculty opponent: Prof. Richard Kerekes, Univ. British Columbia, Vancouver, Canada
Evaluation Committee: Dr. A. Kiviranta, M-real Zanders, Germany, Prof. R. Gebart, Luleå Tekn. Universitet, Tekn.Dr. Mikael Lindström, Fiber och polymerteknik, KTH
Main Advisor: Prof. Gustav Amberg

Claes Holmqvist

Thesis title: Mechanical modelling of blade forming and drainage of flocculated suspensions
Date: March 11, 2005
Faculty opponent: Prof. Douglas Bousfield, University of Maine, USA
Evaluation Commitee: Prof. Staffan Toll, Chalmers, Univ. Lekt. Jesper Oppelstrup, KTH, Ph.D. Lars Martinsson, Albany International
Main Advisor: Doc. Anders Dahlkild

Anders Ahlström

Thesis title: Aeroelastic simulation of wind turbine dynamics
Date: April 8, 2005
Faculty opponent: Prof. Martin O.L. Hansen, Technical University of Denmark, Lyngby, Denmark
Evaluation Committee: Prof. Thomas Abrahamsson, CTH, Prof. Larsgunnar Nilsson, LiU, Doc. Mårten Olsson, KTH
Main Advisor: Prof. Anders Eriksson

Thomas Wright

Thesis title: The linear and nonlinear biomechanics of the middle ear
Date: June 9, 2005
Faculty opponent: Prof. V. Berbyuk, CTH
Evaluation Committee: Prof. Mats Åbom, KTH, Assoc. Prof. Harry Dankowicz, Virginia Polytech. Inst., USA, MD., Ph.D. Magnus von Unge, KI
Main Advisor: Prof. Martin Lesser

Olivier Macchion

Thesis title: CFD in the design of gas quenching furnace
Date: June 16, 2005
Faculty opponent: Prof. Bengt Sundén, LTH
Evaluation Committee: Prof Lars Davidsson, CTH, Doc. Ardeshir Hanifi, FOI, Ph.D. Katarina Gustavsson, KTH
Main Advisor: Adj. Prof. Said Zahrai

Federica De Magistris

Thesis title: Wood fibre deformation in combined shear and compression
Date: September 23, 2005
Faculty opponent: Prof. Patrick Perre, ENGREF - Centre de Nancy, France
Evaluation Committee: Prof. Per Gradin, Mittuniversitetet, Sundsvall, Prof. Hans Petersson, Växjö Universitet, Prof. Sören Östlund, KTH
Main Advisor: Prof. Anders Eriksson

Ori Levin

Thesis title: Numerical studies of transition in wall-bounded flows
Date: December 16, 2005
Faculty opponent: Prof. Nikolaus Adams, Institute of Aerodynamics, Technische Universität München, Germany
Evaluation Committee: Univ. Lekt. Jesper Oppelstrup, KTH, Ph.D. Johan Westin, Vattenfall Utveckling AB, Prof. Bengt Sundén, LTH
Main Advisor: Prof. Dan Henningson

5.2 Licentiate theses presented 2005

Jordan Ko

Thesis title: Numerical study of highly swirling flow in a throughflow cylindrical hydrocyclone
Date: April 8, 2005
External examiner: Prof. Alf-Erik Almstedt, CTH
Main Advisor: Adj. Prof. Said Zahrai

Marko Hyensjö

Thesis title: On fibre suspension flow modelling: Mechanical fibre flocculation and fibre orientation
Date: April 11, 2005
External examiner: Prof. B. Norman, KTH
Main Advisor: Doc. Anders Dahlkild

Johan Eriksson

Thesis title: Experimental and numerical studies of nonsmooth mechanical systems - applications of dimension
Date: April 29, 2005
External examiner: Lektor Jan-Olof Aidanpää, LTU
Main Advisor: Doc. Arne Nordmark

Stefan Ivanell

Thesis title: Numerical computation of wind turbine wakes
Date: March 14, 2005
External examiner: Univ. Lekt. Martin Berggren, Uppsala Universitet
Main Advisor: Prof. Dan Henningson

Erik Stålberg

Thesis title: A high order method for simulation of fluid flow in complex geometries
Date: May 24, 2005
External examiner: Univ. Lekt. Martin Berggren, Uppsala Universitet
Main Advisor: Prof. Dan Henningson

Kenta Inagaka

Thesis title: Development of methodology for analyzing helical structure of electrical cable
Date: November 18, 2005
External examiner: Docent Mårten Olsson, KTH
Main Advisor: Adj. Prof. Said Zahrai

Darja Ljubimova

Thesis title: Numerical modelling of the human eye accommodation
Date: December 14, 2005
External examiner: Ph.D. Ingrid Svensson, LTH
Main Advisor: Prof. Anders Eriksson

Veronica Eliasson

Thesis title: On focusing of strong shock waves
Date: December 15, 2005
External examiner: Professor Nils-Erik Molin, LTU
Main Advisor: Docent Nicholas Apazidis

5.3 Publications 2005

5.3.1 Publications in archival journals

1 Aldaues, F, Lin, Y., Roeraade, J. & Amberg, G., 2005, Superpositioned dielectrophoresis for enhanced trapping efficiency, *J. Electrophoresis*, **26**, 4252–4259.

2 Amberg, G., Shiomi, J., 2005, Thermocapillary flow and phase change in some widespread materials processes, *Fluid Dynamics and Materials Processing*, **1**, 81–96.

3 Bartonek, Å., Gutierrez-Farewik, E.M., Haglund-Åkerlind, Y., Saraste, H., 2005, The influence of spasticity in the lower limb muscles on gait patterns in children with sacral to mid-lumbar myelomeningocele: a gait analysis study, *Gait Posture*, **22**, 10–25.

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5.3.2 Publications in conference proceedings and books

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5.3.3 Technical reports (TRITA)

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98 Stålberg, E., 2005, A high order method for simulation of fluid flow in complex geometries, *Licentiate thesis*, KTH/MEK/TR–05–05–SE.

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5.4 Seminars

Seminars given at KTH

January 20 Geert Brethouwer, KTH, Mechanics
Direct numerical simulation of rotating homogeneous turbulent shear flow.

January 21 Martin Byström, KTH, Mechanics
Optimal disturbances in suction boundary layers.

January 28 Philip Evegren, KTH, Mechanics
Numerical simulation of turbulent blood flow in an artificial heart.

January 28 Ebba Lindencrona and Johanna Sjöbäck, Energiteknik, KTH
Load bank design for a phosphoric acid fuel cell stack.

February 3 Walter Villanueva, KTH, Mechanics
Numerical simulation of two-phase flows using phase-field modeling.

February 10 Michael Thomas, KTH, Mechanics
Wall shear stress measurements with the surface fence technique - theory, numerics and experiments.

February 17 Jerome Hoepffner, KTH, Mechanics
Secondary transient growth on boundary layer streaks.

February 24 Xiaofan Yang , KTH, Mechanics
Turbulence modelling of separation control by means of vortex generators.

March 9 Douglas Bousfield, University of Maine, USA
A model for activity generation on a single wire paper machine.

March 10 Boris Jacob, University of Rome, La Sapienza
Anisotropic fluctuations in turbulent shear flows.

March 17 Olof Grundestam, KTH, Mechanics
Different explicit algebraic Reynolds stress models based on the the least square projection method and their predictions of fully developed turbulent rotating

pipe flow.

April 7 Tobias Strömgren, KTH, Mechanics
Implementation of a flux corrected transport scheme in the Rossy center ocean model.

April 12 Jamel Chahed, Ecole Nationale d'Ingénieurs de Tunis
From experiments to eulerian two-fluid gas-liquid models for turbulent bubbly flows.

April 14 Per Lötstedt, Uppsala University
Adaptive numerical solution of the Euler and Navier-Stokes equations.

April 21 Junichiro Shiomi, Dept. of Mech. Eng, University of Tokyo
Molecular dynamics simulations of anisotropic heat transfer of carbon nanotubes.

April 29 Junichiro Shiomi, Dept. of Mech. Eng, the University of Tokyo
Molecular dynamics simulations of anisotropic heat transfer of carbon nanotubes.

May 19 Olaf Marxen, IAG, Univ. Stuttgart
Numerical studies of the controlled transition process in laminar separation bubbles.

June 9 Philippe Brunet, KTH, Mechanics
Mechanical properties of granular packing : influence of preparation.

June 17 Erik Thunqvist, KTH, Mechanics
Numerisk beräkning av strömning i skalrör.

September 29 Jordan Ko, KTH, Mechanics
Modelling swirling flows in a hydrocyclone.

October 12 Uwe Ehrenstein, Université de Nice-Sophia Antipolis
Description of convective boundary-layer instabilities using global modes.

October 24 Casimir van Doorne, TU Delft
Stereoscopic-PIV on transition in pipe flow.

October 27 Philipp Schlatter, ETH Zentrum, Zurich
LES of transition and turbulence in wall-bounded shear flow.

November 10 Jan Pralits, KTH, Mechanics
Leaky waves in boundary layer flow.

November 11 Enrico Benini and Gabriele Bellani, Univeristy of Bologna, Italy
Design and verification of new apparatus for sedimentation studies.

November 17 Philippe Brunet, KTH, Mechanics
Mechanical properties of granular packing : influence of preparation.

November 22 Göran Rehbinder,
Inertia in heat conduction or analogous phenomena. Methods to determine the inertia coefficient experimentally.

November 24 Ori Levin, KTH, Mechanics
Turbulent spots in the asymptotic suction boundary layer.

December 1 Davide Medici, KTH, Mechanics
The flow field close to a wind turbine.

December 6 Måns Elenius, Nada
Atomic simulation of simple liquids.

December 7 Jeroen Mans, TU Eindhoven
The experimental flat plate boundary layer exposed to free-stream turbulence.