KTH Mechanics

SE-100 44 Stockholm, Sweden

Activity Report 2011

Contents

Preface

This report gives a short overview of the structure and activities at the department of Mechanics, KTH during the year of 2011. More information may be found at the department web site http://www.mech.kth.se.

The teaching activity of the department during 2011 included basic, intermediate, advanced-level as well as graduate courses in mechanics, fluid mechanics and structural mechanics given for students and programmes from almost all schools at KTH.

The scientific activity of the department resulted in the defences of 7 doctoral theses and presentations of 9 licentiate theses during 2011. The publication list for the department this year consists of 57 publications in archival journals, 53 publications in conference proceedings and 16 internal reports, for a total of 126 publications.

Dan Henningson, department chairman

Anders Eriksson, department vice chairman
(responsible for the Activity report)

1 Introduction

The department of Mechanics is one of the seven departments within the School of Engineering Sciences at KTH. The Department had around 100 employees and a turnaround of about 92 MSEK during the year 2011.

Professor Dan Henningson is the chairman of the department, with Professor Anders Eriksson as the vice chairman. Docent Gunnar Tibert is programme responsible ('PA') for the combined MSc programme in Engineering Mechanics, and for the PhD programme of the same name. Docent Hanno Essén is the director of undergraduate studies in mechanics and Docent Erik Lindborg has the same role for fluid mechanics. Docent Anders Dahkild is the director of graduate studies. The department is managed by a group consisting of the professors, the director of undergraduate studies, the programme responsible for MSc and PhD programmes, and the head of department administration.

The undergraduate teaching activity at the department offers a comprehensive course selection in basic mechanics attended by 1 500 students, in fluid mechanics with 500 students and in structural and advanced mechanics with 300 students. With a staff including 10 professors and 18 lecturers, the department is large enough to provide an excellent research environment in a wide range of areas for about 50–60 graduate students. During the year 2011, 7 students defended their PhD theses and 9 presented their Licentiate theses.

The department also, together with the Department of Solid Mechanics and the Marcus Wallenberg laboratory, serves as host for the International MSc Programme in Engineering Mechanics, which offers a broad spectrum of high level courses in solid, structural and fluid mechanics.

Mechanics of solids, structures, fluids and gases are fundamental areas within classical physics and play pivotal roles in the design and analysis for almost all branches of engineering science. Today, this position is emphasized by the increasing width of areas affected and facilitated by the ideas and methods of the subject. Mechanics, and especially fluid mechanics is the basis for almost all electricity generation, such as wind, hydro, nuclear or combustion, but is increasingly important also for the transportation sector. Another developing area is chemical and material sciences in combination where fluid mechanics leads to a deeper understanding of various physical phenomena and also leads to new technical innovations. The research methods of mechanics are also well established and are successfully used in the biological sciences, with applications to the human body. Such a cross-scientific approach opens new possibilities for a better understanding from cells to muscles and locomotion. These exciting new areas go hand in hand with the more traditional applications in a multitude of technological processes used in construction, transportation, paper manufacturing, electro-chemical and pharmaceutical industries, all contributing to the generation of new and challenging research problems. The researchers in the department are divided into eight research groups, without strict formal borders:

- The group of *Structural mechanics* (headed by Professor Anders Eriksson) studies advanced load-carrying structures in both natural and man-made contexts. Numerical modelling is the main tool for static and dynamic equilibrium situations. The main fields of study in recent years have been on one hand flexible and deployable structures for, e.g., space structures, and on the other hand the human musculoskeletal system. For the latter, both the muscular force production, and the neuro-muscular motion planning have been major study areas. Primary applications of the developed methods are clinical investigations of movement disorders and optimal movements in sports activities.

- The *Stability, transition and control* group (headed by Professor Dan Henningson) studies how and why orderly laminar flow transitions to chaotic turbulent flow occur. Large scale numerical experiments are often used to predict this process. In the area of flow control and optimization a step further from just analyzing and understanding flows is taken, and deals with how flows can be manipulated and optimized in order to achieve the objectives at hand. Research is performed in cooperation with universities, research institutes and industry worldwide, e.g. in projects funded by the European Union.

- The *Fluid physics laboratory* (headed by Professor Henrik Alfredsson, and includes group leaders Fransson, Lundell/Söderberg, Apazidis) deals with five main research areas at present: fundamental studies of transition to turbulence and its control in boundary layer flows, high Reynolds number and complex turbulent flows, multiphase flows, e.g. fibre suspension flows related to paper industry, internal compressible flows and shock wave research with applications to shock focusing. The experimental research has access to most modern measurement equipment for fluid flows and several high quality flow research rigs. The compressible flow research is coupled to KTH CCGEx, Competence Centre for Gas Exchange dealing with gas management of IC engines. Although most research projects within the laboratory are of basic character, collaboration with industry (e.g. aeronautical, vehicle and paper industry) is common.

- The research group for *Applied fluid mechanics and multiphase flows* (headed by Professor Laszlo Fuchs) focuses on fluid mechanical problems arising in different applications and in particular turbulent mixing, transport in single and multiphase systems as well as flows involving phase change and chemical reactions. Examples of such flows include the process industry (such as papermaking and pharmaceuticals), propulsion and energy conversion systems. The group has close collaboration and common areas of interest with other groups at the department, in particular the Fluid physics group and KTH CCGEx.

- The *Turbulence group* (headed by Professor Arne Johansson) is active in different areas of turbulence research, including modelling and simulations of high Reynolds number flows, development of subgrid models for Large Eddy Simulations (LES), multiphase turbulent flows and simulation of reactive flows. In collaboration with the Stability transition and control group we develop a new code with high-order compact finite difference

schemes with the aim of simulating high Reynolds number turbulent pipe flow. This effort is also combined with spectral element computations of pipe flow. In collaboration with the Physio-chemical fluid mechanics group we study turbulent change flow with fibres by use of direct numerical simulations. The activities in geophysical flows and climate modeling are expanding and involve a number of external collaboration partners.

- The group of *Physio-chemical fluid mechanics* (headed by Professor Gustav Amberg) studies problems in fluid mechanics dominated by effects such as capillarity, phase change, heat and mass transfer, etc. Examples of application areas are micro fluidics and materials processes.

- In the group of *Theoretical and applied mechanics* (headed by Docent Hanno Essén) research is performed in the following areas: dynamical systems with discontinuous forces, non-linear acoustics, statistical mechanics with magnetic interaction forces, kinetic gas theory, and asymptotic methods in classical and quantum mechanics.

- The group of *Biological and complex flows* (headed by Docent Luca Brandt) studies the behavior of fluids made of rigid or soft particles suspended in a simple fluid. Such complex fluids are the rule in nature and in many industrial applications. Understanding their behavior is a formidable challenge owing to the inherent coupling between the microscale and the macroscale. In our research, the phenomena arising in suspensions are mainly addressed by computer simulations: this calls for the development of physical models of the complicated interactions at play and efficient numerical algorithms exploiting the rapidly increasing capability of modern computers. Examples are the behavior of dense suspensions, mixing in baths of algae and bacteria, pollutant dispersion, the effect of oceanic turbulence on plankton sedimentation, the dynamics of swimming organisms. Most of the different activities are performed within international collaborations. Research on complex and biological fluids aims to improve our understanding of natural phenomena in order to address the technological challenges of our time.

Highlights of 2011

This year was the first when non-European students had to pay for tuition, which drastically changed the number of MSc students at KTH.
This was also the first year of the new combined MSc programme in Engineering Mechanics.
During the year, the previous subjects for PhD education were merged into the common subject Engineering Mechanics.
Lanie Gutierrez-Farewik and Luca Brandt were elected members of the new Faculty advisory group.
A new research group was established: Biological and complex flow under Luca Brandt.
The management group was re-configured.

The Linné FLOW centre was evaluated during the year.
A new wind tunnel to replace the old SB tunnel, mainly to be used for student laboratory exercises, was inaugurated on December 21, 2011 at its temporary location at Brinellvägen 24. It is named NT-2011, New Tunnel 2011 and was mainly designed by Nils Tillmark and skillfully built by Kim Karlström and Göran Rådberg.
Rebuilding of our premises at Teknikringen 8 gave promises but also troubles.

Personnel related matters during 2011

New appointments during 2011

Stefan Ivanell was appointed as lecturer during the year.

Twenty new graduate students started their PhD education at the department during 2011.

We had eleven post-docs and guest students at the department during the year:
Eva Voronkova from St Petersburg State University worked as post-doc.
Antonio Segalini from University of Bologna worked as FLOW post-doc.
Mireia Altimira from University of Navarra worked as post-doc.
Ruth Anne Lambert from University of California at Irvine worked as FLOW post-doc.
Gaetano Sardina from University of Rome la Sapienza worked as post-doc.
George el Khoury from NTNU, Norway worked as post-doc.
Liang Wei from Queen's University worked as post-doc.
Francesco Picano from University of Rome la Sapienza worked as post-doc.
Alexandre Suryadi from Keio University, Japan worked as post-doc.
Pierre Augier from Ecole Polytechnique worked as FLOW post-doc.
Jyothish Kumar from Indian Institute of Technology, Madras Chennai worked as post-doc.

Awards, prizes and funding

Fredrik Lundell was awarded a teacher of the year prize for KTH.

The department was successful in obtaining funding from many different sources. In addition to a continued and increased funding from VR, new funding came from the strategic research areas in E-science, climate and energy. A wide variety of funding was obtained (STEM, Vindforsk, WSC, Vinnova, SNIC, EU, Promobilia, ESA, GGS, FHS and others).

Miscellaneous

Work on course and teaching strategy for the future was continued.

Common department activities

The academic year 2010/2011 was ended at a Summer dinner at restaurant Stallmästregården on June 16th. The department also gathered for a Christmas dinner at restaurant Långholmen Wärdshus on December 14th.

The research groups have had a number of formal and informal meetings.

2 Personnel

Professors

- Alfredsson Henrik, PhD in mechanics, KTH 1983, and Docent at KTH 1985. Professor of fluid physics 1989.
- Amberg Gustav, PhD in fluid mechanics, KTH 1986, and Docent at KTH 1990. Professor of fluid mechanics 1999. Dean of the school of Engineering sciences.
- Eriksson Anders, PhD in steel structures, KTH 1981, and Docent at KTH 1988. Professor of structural mechanics 1992. Department vice chairman.
- Fuchs Laszlo, PhD in gas dynamics, KTH 1977, and Docent at KTH 1980. Professor of fluid mechanics 2007.
- Henningson Dan, PhD in mechanics, KTH 1988, and Docent at KTH 1992. Professor of fluid mechanics 1999. Director of the Swedish e-Science Research Centre (SeRC). Department chairman.
- Johansson Arne, PhD in mechanics, KTH 1983, and Docent at KTH 1984. Professor of mechanics 1991. Director of Linné Flow Center.

Guest Professor

- Lingwood Rebecca, PhD, Cambridge 1996. Director of continued education, Cambridge University.

Adjunct professors

- Hanifi Ardeshir, PhD in fluid mechanics, KTH 1995, and Docent at KTH 2003. Adj. Professor of fluid mechanics 2005 (40% at KTH, 60% at FOI).
- Söderberg Daniel, PhD in fluid mechanics, KTH 1999. Adj. Professor of process fluid mechanics 2008 (20% at KTH, 80% at Innventia).

Professors/lecturers emeriti

- Bark Fritz, PhD in applied mechanics, KTH 1974. Professor of hydromechanics, 1985. Retired in 2010.
- Enflo Bengt, PhD and Docent in theoretical physics, Stockholm Univ. 1965. 'Biträdande professor' at KTH 1996. Retired in 2000.
- Lesser Martin, PhD in aerospace engineering, Cornell, Docent and Professor at LTU. Professor of mechanics at KTH 1987. Retired in 2005.
- Söderholm Lars, PhD and Docent in theoretical physics, Stockholm Univ. 1970. Retired in 2010.

Affiliated Professors

- Nagib Hassan, IIT, Chicago, USA.
- Gutmark Ephraim. Univ. Cincinnatti, USA.

Senior Lecturers

- Apazidis Nicholas, PhD in mechanics, KTH 1985, and Docent at KTH 1994.
- Brandt Luca, PhD in fluid mechanics, KTH 2003, and Docent at KTH 2008.
- Dahlkild Anders, PhD in mechanics, KTH 1988, and Docent at KTH 1992. Director of graduate studies.
- Essén Hanno, PhD in theoretical physics, Stockholm Univ. 1979, and Docent 1986. Director of undergraduate studies.
- Fransson Jens, PhD in fluid mechanics, KTH 2003, and Docent at KTH 2006.
- Gutierrez-Farewik Elena, PhD in orthopedics, KI 2003, and Docent at KTH 2007.
- Hsieh Richard, PhD in mechanics, KTH 1978, and Docent at KTH 1980.
- Lindborg Erik, PhD in Mechanics, KTH 1996, and Docent at KTH 2001. Director of undergraduate studies in fluid mechanics.
- Lundell Fredrik, PhD in fluid mechanics, KTH 2003, and Docent at KTH 2008.
- Nordmark Arne, PhD in mechanics, KTH 1992, and Docent at KTH 1999.
- Nyberg Christer, PhD in mechanics, KTH 1979.
- Schlatter Philipp, PhD in fluid mechanics, ETH Zürich 2005, and Docent at KTH 2009.
- Thylwe Karl-Erik, PhD in theoretical physics, Univ. of Uppsala 1981, and Docent 1987.
- Tibert Gunnar, PhD in structural mechanics, KTH 2002, and Docent at KTH 2009. Programme responsible for MSc. and PhD. programmes in Engineering mechanics.

Lecturers, research associates and researchers

- Bagheri Shervin, PhD in Mechanics, KTH 2010.
- Brandefelt Jenny, PhD in meteorology, Stockholm Univ. 2005.
- Brethouwer Geert, PhD in fluid mechanics, TU Delft 2001.
- Do-Quang Minh, PhD in fluid mechanics, KTH 2004.
- Grundestam Olof, PhD in Mechanics, KTH 2006.
- Ivanell Stefan, PhD in Mechanics, KTH 2009.
- Maxe Gunnar, MSc.
- Prahl Wittberg Lisa, PhD, Lund University 2008.
- Robert Etienne, PhD, EPFL, Lausanne 2008.
- Tillmark Nils, PhD in fluid mechanics, KTH 1995. Responsible for the department's lab. facilities.
- Örlu Ramis, PhD in fluid mechanics, KTH 2009.

Adjunct Lecturers

- Wallin Stefan, PhD in fluid mechanics, KTH 2000. Adj. lecturer in fluid mechanics with turbulence modelling application, (30% at KTH, 70% at FOI).

Guest researchers, post-docs

- *Guest lecturer*: Professor Alessandro Talamelli, University of Bologna (3 months).
- *Post-doc*: Eva Voronkova, St Petersburg State University, Russia.
- *Post-doc*: Antonio Segalini, University of Bologna, Italy.
- *Post-doc*: Mireia Altimira, University of Navarra, Spain.
- *Post-doc*: Ruth Anne Lambert, University of California at Irvine, USA.
- *Post-doc*: Gaetano Sardina, University of Rome la Sapienza, Italy.
- *Post-doc*: George el Khoury, NTNU, Norway.
- *Post-doc*: Liang Wei, Queen's University, Canada.
- *Post-doc*: Francesco Picano, University of Rome la Sapienza, Italy.
- *Post-doc*: Alexandre Suryadi, Keio University, Japan.
- *Post-doc*: Pierre Augier, Ecole Polytechnique, France.
- *Post-doc*: Jyothish Kumar, Indian Institute of Technology, Madras Chennai, India.

Technical and administrative staff

- Bellbrant Karina, course administrator.
- Ekstrand Pär, MSc., system manager.
- Eneqvist Carolina, staff manager.
- Eriksson Olivia, coordinator.
- Hornk Heide, financial manager.
- Karlström Joakim, tool maker.
- Landin Malin, secretary.
- Peplinski Adam, application expert.
- Rådberg Göran, tool maker.
- Silverhag Hans, head of administration.
- Skult Stefan, administrative assistant.

Changes in the department personnel in recent years are summarized in the following table (seen as averages over the year).

	Number of employees during 2004–2011							
Position	2004	2005	2006	2007	2008	2009	2010	**2011**
Prof./Adj. Prof.	10	10	10	11	11	11	10	**10**
Lect./Adj. Lect.	16	16	16	15	14	15	18	**18**
Ass. lect./Researcher/Adjunct	11	12	12	15	15	10	10	**12**
Technical/adm staff	10	9	9	9	7	9	9	**9**
Guest Res./Post-docs	5	5	4	6	5	6	5	**13**
Doctoral students	42	38	37	40	36	46	54	**66**
External doct. stud.	11	8	6	5	9	3	2	**3**
Total	105	98	94	101	97	100	108	**131**

Active graduate students at KTH Mechanics during 2011					
Name	Affiliation	Adv.	Start	TeknL	TeknD
Albernaz Daniel	Mech	GA/MDQ	09/2011		
Alenius Emma	MWL	LF/MÅ	10/2007	12/2010	
Amer Malik	Mech	GA	11/2008		
Appelquist Ellinor	Mech	PS/HAL/RL	11/2011		
Ashwear Nasseradeen	Mech	AE	12/2011		
Bellani Gabrielle	Mech	FL/DS	02/2006	10/2008	05/2011
Berger Marit	Mech	JB	09/2010		
Bodin Olle	Mech	LF	09/2006	03/2009	
Carlsson Andreas	Mech	GA/A-KT	12/2007		
Dadfar Reza	Mech	DH/AH/SB	09/2010		
Dalilsafaei Seif	Mech	AE/GT	11/2008	05/2011	
Deusebio Enrico	Mech	EL	01/2010		
Eriksson Ola	Mech	DH/SI	11/2011		
Fallenius Bengt	Mech	JF/HAL	04/2006	05/2009	11/2011
Farkas Robert	Mech	LF	05/2009		
Fjällman Johan	Mech	LF	04/2010		
Grigoriev Igor	Mech	AJ/GB	09/2011		
Hosseini Mohammad	Mech	AH	12/2010		
Håkansson Karl	Mech	DS/LPW/FL	11/2009		
Imayama Shintaro	Mech	HAL/RL	04/2010		
Kalpakli Athanasia	Mech	HAL/NT/RÖ	03/2009		
Kekesi Timea	Mech	GA/LPW	02/2011		
Khapko Taras	Mech	DH/PS	08/2011		
Kjellander Malte	Mech	NA/NT	05/2007	04/2010	
Klets Olesya	Mech	LGF/AE	09/2008	06/2011	
Klinkenberg Joy	Mech	LB	06/2009	10/2011	
Kosterina Natalia	Mech	AE/LGF	11/2006	06/2009	
Kvick Mathias	Mech	FL/DS	11/2009		
Lashgari Iman	Mech	LB	11/2011		
Laurantzon Fredrik	Mech	HAL/NT/RÖ	06/2007	12/2010	
Lazeroms Werner	Mech	AJ	02/2011		
Lenaers Peter	Mech	AJ/GB/PS	02/2009		
Li Qiang	Mech	DH/PS	05/2007	10/2009	10/2011
Malm (Ohlsson) Johan	Mech	DH/PS	03/2007	12/2009	12/2011
Manda Krishnagoud	Mech	AE/GT	10/2008	12/2010	
Mellgren Niklas	Mech	MV	05/2003	09/2009	
Monokrousos Antonios	Mech	DH/LB	02/2007	06/2009	05/2011
Muld Tomas	MWL	DH/GE	04/2007	05/2010	
Nilsson Karl	Mech	DH/SI	03/2010		
Noorani Azad	Mech	PS/LB	02/2011		
Odemark Ylva	Mech	JF/DH	02/2010		
Parrera Pau Mallol	Mech	GT/AE	04/2011		
Pastuhoff Markus	Mech	HAL/NT	05/2009		
Pettersson Robert	Mech	AE/LGF/AN	09/2006	06/2009	
Pouransari Zeinab	Mech	AJ/GB	04/2009	09/2011	
Rasam Amin	Mech	AJ/GB	03/2009	05/2011	

(cont.d)

Active graduate students at KTHMechanics during 2011					
Name	Affiliation	Adv.	Start	TeknL	TeknD
Rosén Tomas	Mech	FL/MDQ	10/2011		
Sakowitz Aleksander	Mech	LF	12/2008	12/2011	
Sarmast Sasan	Mech	DH	02/2010		
Semerano Onofrio	Mech	DH/LB	10/2008	02/2011	
Semlitsch Bernhard	Mech	LF	03/2011		
Shahinfar Shahab	Mech	JF/HAL	06/2008	06/2011	
Shahriari Nima	Mech	AH/DH	08/2011		
Shirvan Sohrab	Mech	JF/AT	03/2011		
von Stillfried Florian	Mech	AJ/SW	09/2007	12/2009	
Söder Martin	Scania	LF	11/2010		
Tahir Abdul Malik	Mech	GA	08/2008		
Tammisola Outi	Mech	DS/FL	06/2006	03/2009	06/2011
Tempelmann David	Mech	DH/AH	03/2007	12/2009	12/2011
Teneller Görkem	Mech	DH/SI	09/2011		
Trip Renzo	Mech	JF/SC/BF	06/2011		
Wang Ruoli	Mech	LGF/AE	06/2007	10/2009	
Wang Yue	Mech	LF	02/2010		
Wang Yuli	Mech	GA/MDQ	11(2011		
van Wyk Stevin	Mech	LF/LPW	08/2009	12/2011	
Zhan Cai-Juan	Mech	LB/AD	10/2011		
Zhang Feng	Mech	AD/FL	02/2010		
Zhu Lailai	Mech	LB/GA/MDQ	09/2009		

3 Economy

The financial state of the department is summarized in the table and diagrams below. The seemingly extremely positive result for the year 2008 was to a large extent related to the moving of Prof. Laszlo Fuchs from Lund University to KTH.

KTH Mekanik, resultat			
RESULTATRÄKNING 2011 (kSEK)	GRU	FOFU	Totalt
Gruanslag	22 130	0	22 130
Fofuanslag	0	31 141	31 141
Bidrag fr externa finansiärer	0	31 640	31 640
Övriga intäkter	189	825	1 014
Finansiella intäkter	148	563	711
SUMMA INTÄKTER	22 467	64 169	86 636
Personalkostnader	11 942	42 256	54 198
Lokalkostnader	1 399	8 243	9 642
Resor och traktamenten	7	2 920	2 927
Drift och övrigt	1 225	4 681	5 906
Gemensamma kostnader	7 845	10 975	18 820
Avskrivningar	14	782	796
Finansiella kostnader	1	10	11
SUMMA KOSTNADER	22 432	69 867	92 299
ÅRETS KAPITALFÖRÄNDRING	35	-5 698	-5 663

RESULTATRÄKNING (kSEK)	2004	2005	2006	2007	2008	2009	2010	2011
Gruanslag	14 519	16 089	15 784	14 779	15 580	14 764	20 283	22 130
Fofuanslag	19 070	20 294	22 231	23 355	25 206	23 823	26 093	31 141
Externa intäkter	30 276	26 586	24 991	24 594	35 593	30 987	41 109	33 365
SUMMA INTÄKTER	*63 865*	*62 969*	*63 006*	*62 728*	*76 379*	*69 574*	*87 485*	*86 636*
SUMMA KOSTNADER	*65 448*	*64 506*	*63 267*	*63 665*	*64 733*	*68 769*	*80 531*	*92 299*
ÅRETS KAPITALFÖRÄNDRING	-1 582	-1 537	-261	-937	11 646	804	6 954	-5 663

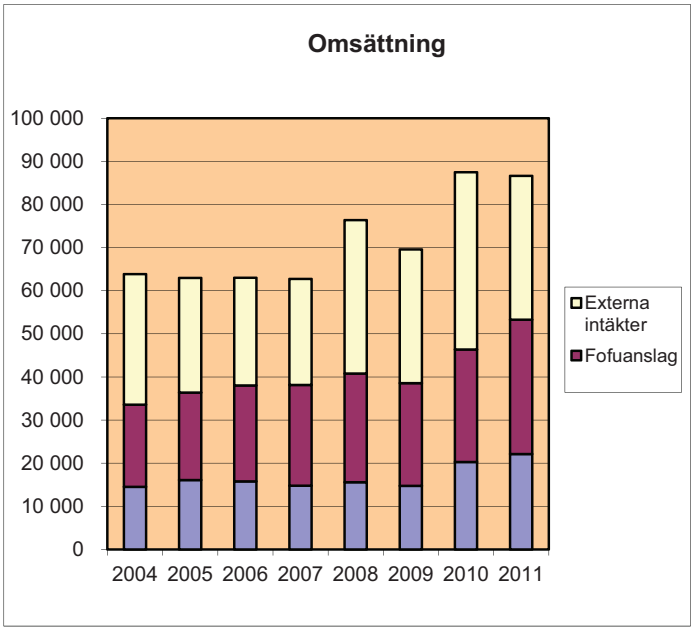

Figure 1: Turnaround in SEK during 2004–2011

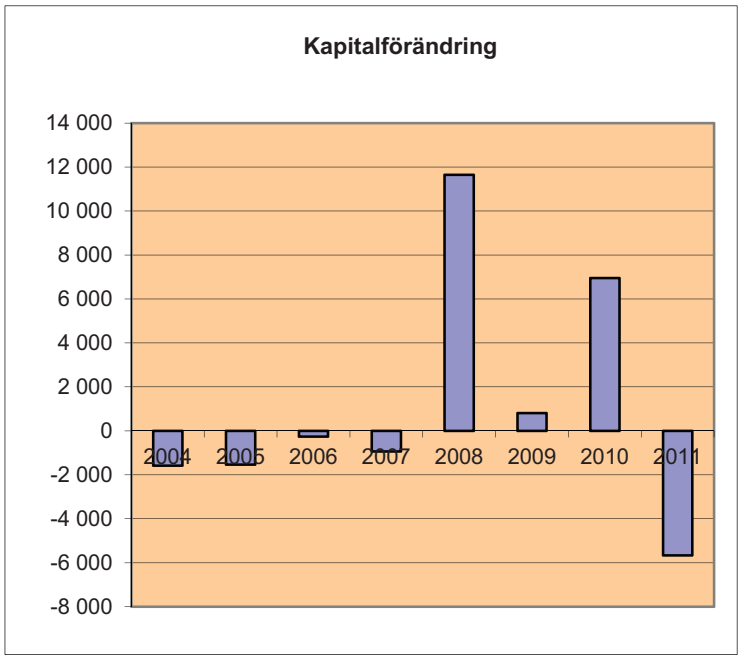

Figure 2: The surplus/deficit in SEK during 2004–2011

4 Teaching activities

4.1 Undergraduate courses

These data refer to the academic year 2010/2011.

Progr.: Year	Code	Credit	Name	Responsible
Basic courses mechanics				
K, Bio : 1	SG1102	6,0	Mechanics, smaller course	Lindborg
OPEN : 1	SG1102	6,0	Mechanics, smaller course	Lundell
E : 2	SG1102	6,0	Mechanics, smaller course	Nordmark
EN : 1	SG1102	6,0	Mechanics, smaller course	Maxe
MT : 1	SG1102	6,0	Mechanics, smaller course	Brandefelt
S : 2	SG1107	7,5	Mechanics	Thylwe
ME : 1	SG1108	7,5	Applied physics, mechanics	Hsieh
I : 1	SG1109	8,0	Mechanics for I	Essén
F : 2	SG1113	6,0	Mechanics, continuation course	Apazidis
F : 1	SG1130	9,0	Mechanics I	Apazidis
CL : 2	SG1130	9,0	Mechanics I	Apazidis
BD : 1	SG1130	9,0	Mechanics I	Nyberg
M : 1	SG1130	9,0	Mechanics I	Nyberg
T : 1	SG1131	11,0	Mechanics I	Nyberg
P : 1	SG1130	9,0	Mechanics I	Thylwe
M : 2	SG1140	6,0	Mechanics II	Thylwe
T : 2	SG1140	6,0	Mechanics II	Nyberg
P : 2	SG1140	6,0	Mechanics II	Gutierrez-Farewik
CL: 3	SG1140	6,0	Mechanics II	Gutierrez-Farewik
Advanced courses				
All : 4	SG2126	7,5	Nonlinear dynamics	Nordmark
All: 4	SG2127	3	Research methodology in mechanics	Brandefelt
All : 3	SG2150	7,5	Rigid body dynamics	Essén
Advanced courses structural mechanics				
S : 3	SG1801	7,5	Structural mechanics	Eriksson
S : 4	SG2802	7,5	Membranes, plates and FEM	Tibert
S : 4	SG2803	7,5	Num. modelling and simulation	Eriksson
All : 4	SG2804	7,0	Biomechanics of human movement	Gutierrez-Farewik
All : 4	SG2860	7,5	Finite element modelling	Eriksson
All : 4	SG2870	7,5	Non-linear FEM	Tibert
Basic courses fluid mechanics				
T : 2	SG1216	6,0	Thermodynamics	Dahlkild
T : 2	SG1217	6,0	Fluid mechanics	A. Karlsson
M, P : 3	SG1220	6,0	Fluid mechanics for engineers	Lundell

(cont.d)

Advanced courses fluid mechanics				
All : 4	SG2211	6,0	Vehicle aerodynamics	Talamelli
All : 4	SG2212	7,5	CFD	Hanifi & Schlatter
All : 4	SG2213	3,0	Appl. comp. fluid dynamics	Wallin
All : 4	SG2215	7,5	Compressible flow	Alfredsson
All : 3	SG2214	7,5	Fluid mechanics, general course	Dahlkild
All : 4	SG2218	7,5	Turbulence	Alfredsson
All : 4	SG2219	7,5	Advanced compressible flows	Alfredsson, Tillmark & Dahlkild
All : 4	SG2221	7,5	Wave motion and stability	Fransson & Brandt
F : 3	SG2223	9,0	Fluid mechanics	Lindborg & Fransson
All : 4	KF2050	6,0	Paper process technology	Söderberg

The numbers of students based on hås/håp: 8*(hås+håp)/2 during the years 2004-2011 are summarized in the following table. Note that data refer to the academic year ending in the year given.

Number of students during 2004-2011								
Courses	2004	2005	2006	2007	2008	2009	2010	**2011**
Basic mechanics	1504	1442	1371	1403	1232	1295	1518	**1473**
Upper level mechanics courses	96	52	48	42	35	45	47	**32**
Fluid mechanics	352	514	425	363	367	439	431	**521**
Structural mechanics	262	183	146	133	179	159	136	**248**

4.2 Master's thesis projects

Master's theses during 2011

Name	Title	Examiner
Emelie Barman	Aerodynamics of flutter	H. Essén
Jing Chen	Mechanics of optimal rowing	A. Eriksson
Yoann Prigent	A finite model of bi-stable woven composite tape springs	G. Tibert
Ahmed Mansoor	Numerical study of micro-organisms in shear flows	L. Brandt
Patrick Bennani	Development and optimization of synthetic jets for active flow control	H. Alfredsson
Simon Haque	Stability of fluids with shear-dependent viscosity in the lid-driven cavity	L. Brandt
Md Kamrul Hasan	Simulation model for two-phase pipe flow	S. Wallin
Mubashar Khan	Investigation of the effect of bending ratio on the rheology of a dense suspension of flexible fibers using lattice Boltzmann method	M. Do Quang
Miriam La Vecchia	Bacterial chemotaxis in non-homogeneous shear flow	L. Brandt
Iman Lashgari	Instability of shear-thinning fluids past a circular cylinder	L. Brandt
Tomas Rosén	Determination of water saturation dependent gas transport properties of PEFC gas diffusion layers via the Lattice Boltzmann method	F. Lundell
Sohrab Sattarzadeh	Experimental study of complex pipe flow	H. Alfredsson
Xiang Xingyu	Production evaluation of wind farms-tool improve production analysis method	L. Fuchs
Fan Zou	Estimation of wind energy production for Offshore wind farm. Method validation of wind farm models using WindSim	S. Ivanell, D. Henningson
Niklas Karlsson	Zero Angular momentum rotation of three-particle system	H. Essén
João Neto	Yield optimization based on wind resource	L. Brandt
Gohar Khokar	Numerical simulation of the flow in a disc refiner	L. Prahl Wittberg
Andreas Hörnell	The effects of mass flux on the stability characteristics of the von Kármán boundary layer	R. Lingwood

4.3 Graduate courses

These data refer to the academic year 2010/2011. In addition several reading courses were also given.

- SG3105 Fluid mechanics for graduate students (Lindborg, Dahlkild, Söderholm)
- SG3112 Turbulence (Johansson)
- SG3113 Compressible flow for graduate students (Alfredsson)
- SG3114 Numerical methods in fluid mechanics (Hanifi, Schlatter)
- SG2221 Wave motions and hydrodynamic stability (Brandt, Fransson)
- SG3128 Vehicle aerodynamics (Talamelli)
- FLOW Summer School in Micro and Complex Flows,(3 external teachers)
- Advanced Matlab ocurse: hands on workshop (Brandt)

5 Research activities

5.1 Doctoral theses defended

Gabriele Bellani

Thesis title: Experimental studies of complex flows through image-based techniques
Date: May 19, 2011
Faculty opponent: Professor James Olson, University of British Columbia
Evaluation committee: Professor Staffan Lundström, LTU, Professor Pentti Saarenrinne, Tampere, Dr Fredrik Innings, TetraPak
Main advisor: Docent Fredrik Lundell

Antonios Monokrousos

Thesis title: Optimisation and control of shear flows
Date: May 27, 2011
Faculty opponent: Professor Laurette S. Tuckerman, PMMH-ESPCI
Evaluation committee: Professor Lennart Löfdahl, Chalmers, Docent Jesper Oppelstrup, KTH, Professor Spencer Sherwin, Imperial College
Main advisor: Professor Dan Henningson

Outi Tammisola

Thesis title: Numerical stability studies of one-phase and immiscible two-phase jets and wakes
Date: June 13, 2011
Faculty opponent: Professor Rama Govindarajan, JNCASR, Bangalore
Evaluation committee: Professor Martin Berggren, UmU, Professor Rebecca Lingwood, KTH, Docent Johan Revstedt, LTH
Main advisor: Docent Daniel Söderberg

Qiang Li

Thesis title: Direct and large-eddy simulations of turbulent boundary layers with heat transfer
Date: October 10, 2011
Faculty opponent: Professor Gary Coleman, University of Southampton
Evaluation committee: Dr Gunilla Efraimsson, KTH, Professor Sinisa Krajnovic, Chalmers, Docent Johan Revstedt, LTH
Main advisor: Docent Philipp Schlatter

Bengt Fallenius

Thesis title: Experimental design and vortex analyses in turbulent wake flows
Date: November 11, 2011
Faculty opponent: Dr Marianna Braza, Institut de Mécanique des Fluides de Toulouse
Evaluation committee: Professor Helge Andersson, NTNU, Dr Susann Boij, KTH, Docent Christoffer Norberg, LTH
Main advisor: Docent Jens H. M. Fransson

David Tempelmann

Thesis title: Receptivity of crossflow-dominated boundary layers
Date: December 9, 2011
Faculty opponent: Professor Anatoli Tumin, University of Arizona
Evaluation committee: Professor Chris Atkin, City University London, Professor Lars-Erik Eriksson, Chalmers, Professor Jan Nordström, LiU
Main advisor: Adj. professor Ardeshir Hanifi

Johan Malm

Thesis title: Spectral-element simulations of turbulent wall-bounded flows including transition and separation
Date: December 16, 2011
Faculty opponent: Dr-ing. Suad Jakirlic, TU Darmstadt
Evaluation committee: Professor Lars Davidson, Chalmers, Docent. Jesper Oppelstrup, KTH, Dr Mattias Sillen, SAAB
Main advisor: Professor Dan Henningson

5.2 Licentiate theses presented

Onofrio Semeraro

Thesis title: Feedback control and modal structures in transitional shear flows
Date: February 18, 2011
External examiner: Associate Professor Mihailo Jovanovic, University of Minnesota
Main advisor: Professor Dan Henningson

Seif Dalilsafaei

Thesis title: Stiffness modification of tensegrity structures
Date: May 26, 2011
External examiner: Dr Karl-Gunnar Olsson, Chalmers
Main advisor: Professor Anders Eriksson

Amin Rasam

Thesis title: Explicit algebraic subgrid-scale stress and passive scalar flux modeling in large eddy simulation
Date: May 30, 2011
External examiner: Dr Shia-Hui Peng, FOI
Main advisor: Professor Arne Johansson

Shahab Shahinfar

Thesis title: Transitional boundary layers caused by free-stream turbulence
Date: June 9, 2011
External examiner: Dr Johan Westin, Hägglunds AB
Main advisor: Docent Jens H. M. Fransson

Olesya Klets

Thesis title: Subject-specific musculoskeletal modeling of the lower extremities in persons with unilateral cerebral palsy
Date: June 13, 2011
External examiner: Docent Svein Kleiven, KTH
Main advisor: Docent Lanie Gutierrez-Farewik

Zeinab Pouransari

Thesis title: Fundamental studies of non-premixed combustion in turbulent wall-jets using numerical simulation
Date: September 28, 2011
External examiner: Dr Christer Fureby, FOI
Main advisor: Professor Arne Johansson

Joy Klinkenberg

Thesis title: Stability analysis of channel flow laden with small particles.
Date: October 7, 2011
External examiner: Dr Cristian Marchioli, University of Udine
Main advisor: Docent Luca Brandt

Alexander Sakowitz

Thesis title: On the computation of turbulent mixing processes with application to EGR in IC-engines
Date: December 2, 2011
External examiner: Professor Michel Cervantes, LTU
Main advisor: Professor Laszlo Fuchs

Stevin van Wyk

Thesis title: Unsteadiness of blood flow in 90-degree bifurcations
Date: December 8, 2011
External examiner: Professor Staffan Lundström, LTU
Main advisor: Professor Laszlo Fuchs

5.3 Publications

5.3.1 Publications in archival journals

1 P. Henrik Alfredsson, Ramis Örlü, and Philipp Schlatter, 2011, The viscous sublayer revisited — exploiting self-similarity to determine the wall position and friction velocity. *Experiments in Fluids*, 51(1):271–280.

2 P. Henrik Alfredsson, Antonio Segalini and Ramis Örlü, 2011, A new scaling for the streamwise turbulence intensity in wall-bounded turbulent flows and what it tells us about the "outer" peak. *Physics of fluids*, 23:41702.

3 Shervin Bagheri and Dan S. Henningson, 2011, Transition delay using control theory. *Philosophical Transactions. Series A*, 369(1940):1365–1381, 2011.

4 Åsa Bartonek, Cecilia M. Lidbeck, Robert Pettersson, Eva Broström Weidenhielm, Marie Eriksson, and Elena Gutierrez-Farewik, 2011, Influence of heel lifts during standing in children with motor disorders. *Gait & Posture*, 34(3):426–431.

5 Jenny Brandefelt, E. Kjellstrom, J. O. Naslund, G. Strandberg, A. H. L. Voelker, and B. Wohlfarth, 2011, A coupled climate model simulation of marine isotope stage 3 stadial climate. *Climate of the Past*, 7(2):649–670.

6 Luca Brandt, Denis Sipp, Jan O. Pralits, and Olivier Marquet, 2011, Effect of base-flow variation in noise amplifiers: the flat-plate boundary layer. *Journal of Fluid Mechanics*, 687:503–528.

7 Allan Carlsson, Karl Håkansson, Mathias Kvick, Fredrik Lundell, and Daniel Söderberg, 2011, Evaluation of steerable filter for detection of fibres in flowing suspensions. *Experiments in Fluids*, 51(4):987–996.

8 Gennaro Coppola and Onofrio Semeraro, 2011, Interfacial instability of two rotating viscous immiscible fluids in a cylinder. *Physics of fluids*, 23(6):064105.

9 Carlo Cossu, Luca Brandt, Shervin Bagheri, and Dan S. Henningson, 2011, Secondary threshold amplitudes for sinuous streak breakdown. *Physics of fluids*, 23(7):074103.

10 Anders Dahlkild, 2011, Finite wavelength selection for the linear instability of a suspension of settling spheroids. *Journal of Fluid Mechanics*, 689:183–202.

11 Minh Do-Quang, A Carlson, and G Amberg, 2011, The impact of ink-jet droplets on a paper-like structure. *Fluid Dynamics and Materials Processing*, 7(4):389–402.

12 Yohann Duguet, Olivier Le Maitre, and Philipp Schlatter, 2011, Stochastic and deterministic motion of a laminar-turbulent front in a spanwisely extended Couette flow. *Physical Review E. Statistical, Nonlinear, and Soft Matter Physics*, 84(6):066315.

13 Anders Eriksson and Arne Nordmark, 2011, Activation dynamics in the optimization of targeted movements. *Computers & structures*, 89(11-12):968–976.

14 Anders Eriksson and Krister Svanberg, 2011, Optimization in simulations of human movement planning. *Int. j. Num. Meth. Eng.*, 87(12): 1127–1147.

15 Hanno Essén, 2011, Classical diamagnetism, magnetic interaction energies, and repulsive forces in magnetized plasmas. *Europhysics letters*, 94(4):47003.

16 Philip Evegren, Johan Revstedt, and Laszlo Fuchs, 2011, Pulsating flow and mass transfer in an asymmetric system of bifurcations. *Computers & Fluids*, 49(1):46–61.

17 Miguel Fiolhais, Hanno Essén, Constanta Providencia, and Arne Nordmark, 2011, Magnetic field and current are zero inside ideal conductors. *Progress in Electromagnetics Research B*, 27:187–212.

18 R. Friedrich and Arne V. Johansson, 2011, Sixth international symposium on turbulence and shear flow phenomena. Foreword to special issue. *Journal of turbulence*, 12(14):1–2.

19 Matthew Juniper, Outi Tammisola, and Fredrik Lundell, 2011, The local and global stability of confined planar wakes at intermediate Reynolds number. *Journal of Fluid Mechanics*, 686:218–238.

20 Athanasia Kalpakli, Ramis Örlü, Nils Tillmark, and P. Henrik Alfredsson, 2011, Pulsatile turbulent flow through pipe bends at high Dean and Womersley numbers. *Journal of Physics, Conference Series*, 318:092023.

21 Malte Kjellander, Nils Tillmark, and Nicholas Apazidis, 2011, Experimental determination of self-similarity constant for converging cylindrical shocks. *Physics of fluids*, 23(11):116103.

22 Joy Klinkenberg, H. C. de Lange, and Luca Brandt, 2011, Modal and non-modal stability of particle-laden channel flow. *Physics of fluids*, 23(6):064110.

23 Thomas Kurian, Jens H. M. Fransson, and P. Henrik Alfredsson, 2011, Boundary layer receptivity to free-stream turbulence and surface roughness over a swept flat plate. *Physics of fluids*, 23(3):034107.

24 Thomas Kurian and Jens H. M. Fransson, 2011, Transient growth in the asymptotic suction boundary layer. *Experiments in Fluids*, 51(3):771–784.

25 Rebecca Lingwood and S. J. Garrett, 2011, The effects of surface mass flux on the instability of the BEK system of rotating boundary-layer flows. *European journal of mechanics. B, Fluids*, 30(3):299–310.

26 Fredrik Lundell, L. Daniel Söderberg, and P. Henrik Alfredsson, 2011, Fluid mechanics of papermaking. *Annual Review of Fluid Mechanics*, 43:195–217.

27 Fredrik Lundell, 2011, The effect of particle inertia on triaxial ellipsoids in creeping shear: from drift toward chaos to a single periodic solution. *Physics of fluids*, 23(1):11704.

28 Krishnagoud Manda, Leif Ryd, and Anders Eriksson, 2011, Finite element simulations of a focal knee resurfacing implant applied to localized cartilage defects in a sheep model. *Journal of Biomechanics*, 44(5):794–801.

29 Olaf Marxen and Dan S. Henningson, 2011, The effect of small-amplitude convective disturbances on the size and bursting of a laminar separation bubble. *Journal of Fluid Mechanics*, 671:1–33.

30 D. Medici, S. Ivanell, J.-Å. Dahlberg, and P. Henrik Alfredsson, 2011, The upstream flow of a wind turbine: blockage effect. *Wind Energy*, 14(5):691–697.

31 Antonios Monokrousos, Alessandro Bottaro, Luca Brandt, Andrea Di Vita, and Dan S. Henningson, 2011, Nonequilibrium thermodynamics and the optimal path to turbulence in shear flows. *Physical Review Letters*, 106(13):134502.

32 Girts Murans, Elena M. Gutierrez-Farewik, and Helena Saraste, 2011, Kinematic and kinetic analysis of static sitting of patients with neuropathic spine deformity. *Gait & Posture*, 34(4):533–538.

33 Arne B. Nordmark, Harry Dankowicz, and Alan Champneys, 2011, Friction-induced reverse chatter in rigid-body mechanisms with impacts. *IMA Journal of Applied Mathematics*, 76(1):85–119.

34 Zeinab Pouransari, Geert Brethouwer, and Arne J. Johansson, 2011, Direct numerical simulation of an isothermal reacting turbulent wall-jet. *Physics of fluids*, 23(8):085104.

35 Amin Rasam, Geert Brethouwer, Philipp Schlatter, Qiang Li, and Arne V. Johansson, 2011, Effects of modelling, resolution and anisotropy of subgrid-scales on large eddy simulations of channel flow. *Journal of turbulence*, 12(10):1–20.

36 Philipp Schlatter, Shervin Bagheri, and Dan S. Henningson, 2011, Self-sustained global oscillations in a jet in crossflow. *Theoretical and Computational Fluid Dynamics*, 25(1-4):129–146, 2011.

37 Lars-Uve Schrader, Luca Brandt, and Tamer A. Zaki, 2011, Receptivity, instability and breakdown of Görtler flow. *Journal of Fluid Mechanics*, 682:362–396.

38 Antonio Segalini, Ramis Örlü, Philipp Schlatter, P. Henrik Alfredsson, Jean-Daniel Rüedi, and Alessandro Talamelli, 2011,

A method to estimate turbulence intensity and transverse Taylor microscale in turbulent flows from spatially averaged hot-wire data. *Experiments in Fluids*, 51(3):693–700.

39 Antonio Segalini and A. Talamelli, 2011, Experimental analysis of dominant instabilities in coaxial jets. *Physics of fluids*, 23(2):24103.

40 Onofrio Semeraro, Shervin Bagheri, Luca Brandt, and Dan S. Henningson, 2011, Feedback control of three-dimensional optimal disturbances using reduced-order models. *Journal of Fluid Mechanics*, 677:63–102.

41 Martin Skote, Gustaf Mårtensson, and Arne V. Johansson, 2011, Flow in a rapidly rotating cone-shaped pcr-tube. *International journal of numerical methods for heat & fluid flow*, 21(6):717–735.

42 Gustav Strandberg, Jenny Brandefelt, Erik Kjellstrom, and Benjamin Smith, 2011, High-resolution regional simulation of last glacial maximum climate in Europe. *Tellus. Series A, Dynamic meteorology and oceanography*, 63(1):107–125.

43 Tobias Strömgren, Geert Brethouwer, Gustav Amberg, and Arne V. Johansson, 2011, Deriving fluid-particle correlation closures for Eulerian two-fluid models through use of Langevin equations. *European journal of mechanics. B, Fluids*, 30(3):275–280.

44 Tobias Strömgren, Geert Brethouwer, Gustav Amberg, and Arne V. Johansson, 2011, A modelling study of evolving particle-laden turbulent pipe-flow. *Flow Turbulence and Combustion*, 86(3–4):477–495.

45 Alessandro Talamelli and Antonio Segalini, 2011, "Lock-in" phenomenon in coaxial jets. *Journal of Visualization*, 14(4):305–306.

46 Outi Tammisola, Fredrik Lundell, Philipp Schlatter, Armin Wehrfritz, and Daniel Söderberg, 2011, Global linear and nonlinear stability of viscous confined plane wakes with co-flow. *Journal of Fluid Mechanics*, 675:397–434.

47 Outi Tammisola, Atsushi Sasaki, Fredrik Lundell, Masaharu Matsubara, and L. Daniel Söderberg, 2011, Stabilizing effect of surrounding gas flow on a plane liquid sheet. *Journal of Fluid Mechanics*, 672:5–32.

48 Karl-Erik Thylwe and Staffan Linnaeus, 2011, Semiclassical aspects and supersymmetry of bound Dirac states for central pseudo-scalar potentials. *Physica Scripta*, 84(2):025006.

49 Karl-Erik Thylwe and P. McCabe, 2011, Amplitude-phase calculations of Regge poles obtained from coupled radial Dirac equations. *Journal of Physics A*, 44(27):275305.

50 Andreas Vallgren, Enrico Deusebio, and Erik Lindborg, 2011, Possible explanation of the atmospheric kinetic and potential energy spectra. *Physical Review Letters*, 107(26):268501.

51 Andreas Vallgren, 2011, Infrared Reynolds number dependency of the two-dimensional inverse energy cascade. *Journal of Fluid Mechanics*, 667:463–473.

52 Edmond J. Walsh, Donald M. Mc Eligot, Luca Brandt, and Phillip Schlatter, 2011, Entropy generation in a boundary layer transitioning under the influence of freestream turbulence. *Journal of Fluids Engineering - Trancactions of The ASME*, 133(6):061203.

53 Ruoli Wang and Elena Gutierrez Farewik, 2011, The effect of subtalar inversion/eversion on the dynamic function of the tibialis anterior, soleus, and gastrocnemius during the stance phase of gait. *Gait & Posture*, 34(1):29–35.

54 Florian von Stillfried, Stefan Wallin and Arne V. Johansson, 2011, Evaluation of a vortex generator model in adverse pressure gradient boundary layers. *AIAA Journal*, 49(5):982–993.

55 Lailai Zhu, Minh Do-Quang, Eric Lauga, and Luca Brandt, 2011, Locomotion by tangential deformation in a polymeric fluid. *Physical Reivew E*, 83(1):011901.

56 Ramis Örlü and Henrik Alfredsson, 2011, The life of a vortex in an axisymmetric jet. *Journal of Visualization*, 14(1):5–6.

57 Ramis Örlü and Philipp Schlatter, 2011, On the fluctuating wall-shear stress in zero pressure-gradient turbulent boundary layer flows. *Physics of fluids*, 23(2):21704.

5.3.2 Other publications

58 Monica Alaniz, Serhiy Belyayev, David Bergman, Gustav Casselbrant, Mark Honeth, Jiangwei Huang, Nickolay Ivchenko, Mikko Laukkanen, Jacob Michelsen, Vira Pronenko, Malin Paulson, Georg Schlick, Gunnar Tibert, and Mario Valle, 2011, The Squid sounding rocket experiment. In *Proc. 20th ESA Symposium on European Rocket and Balloon Programmes and Related Research*, pages A–047–.

59 Emma Alenius, Mats Åbom, and Laszlo Fuchs, 2011, Scattering of plane waves by a constriction. In *Proc. ASME Turbo Expo 2011.*

60 P. Henrik Alfredsson, Ramis Örlü, and Antonio Segalini, 2011, A new formulation for the streamwise turbulence intensity distribution. In *13th European Turbulence Conference (ETC13): Wall-Bounded Flows And Control Of Turbulence.*

61 Mireia Altimira, Alejandro Rivas, Juan Carlos Ramos, and Raul Anton, 2011, Disintegration regime of industrial fan-spray atomizers through CFD simulations. In *ILASS– Europe 2011, 24th European Conference on Liquid Atomization and Spray Systems.*

62 P. Boyanova P, M. Do-Quang, and M. Neytcheva, 2011, Solution methods for the Cahn–Hilliard equation discretized by conforming and non-conforming finite elements, *Technical report*, KTH Mechanics.

63 Geert Brethouwer, Yohann Duguet, and Philipp Schlatter, 2011, Numerical study of turbulent-laminar patterns in MHD, rotating and stratified shear flows. In *Direct and Large-Eddy Simulation VIII*.

64 Geert Brethouwer, Philipp Schlatter, and Arne Johansson, 2011, Turbulence instabilities and passive scalars in rotating channel flow. In *13th European Turbulence Conference (ETC13): Instability, Transition, Grid Turbulence And Jets*.

65 Geert Brethouwer, Philipp Schlatter, and Arne Johansson, 2011, Effects of rapid spanwise rotation on turbulent channel flow with a passive scalar. In*Proc. 7th International Symposium on Turbulence and Shear Flow Phenomena*.

66 S. Camarri, Bengt E. G. Fallenius, and Jens H. M. Fransson, 2011, Stability and sensitivity analysis of experimental flow fields measured past a porous cylinder.

67 Seif Dalil Safaei, Anders Eriksson, and Gunnar Tibert, 2011, Optimum pre-stress design for frequency requirement of tensegrity structures. In *Proc. 10th World Congress on Computational Mechanics*.

68 Seif Dalil Safaei, Anders Eriksson, and Gunnar Tibert, 2011, Sensitivity analysis of tensegrity booms due to member loss. In *Proc. NSCM-24*.

69 Seif Dalil Safaei, Anders Eriksson, and Gunnar Tibert, 2011, Application of flexibility analysis for design of tensegrity structures. In *Proc. 4th Structural Engineering World Congress*.

70 Enrico Deusebio, Philipp Schlatter, Geert Brethouwer, and Erik Lindborg, 2011, Direct numerical simulations of stratified open channel flows. In *13th European Turbulence Conference (ETC13): Wall-Bounded Flows And Control Of Turbulence*.

71 Yohann Duguet and Philipp Schlatter, 2011, Stochastic motion of a laminar/turbulent interface in a shear flow. In *Number 318 in Journal of Physics: Conference Series*.

72 Anders Eriksson and Arne Nordmark, 2011, Instability of thin hyper-elastic space membranes under pressure loads. In *Proc. TCCM-2011*.

73 Anders Eriksson, 2011, Quasi-static simulations of thin membranes, aiming at stability analyses of balloon-like structures. In *Proc. Compdyn 2011*.

74 Bengt Fallenius, T. Renzo, and Jens H. M. Fransson, 2011, Measurements in a bluff body wake with variable inlet conditions.

75 Bengt E. G. Fallenius and Jens H. M. Fransson, 2011, Experiments on a bluff body wake with varying inlet conditions.

76 Jens H. M. Fransson, Bengt E. G. Fallenius, Shahab Shahinfar, Sohrab Shirvan Sattarzadeh, and Alessandro Talamelli, 2011, Advanced fluid research on drag reduction in turbulence experiments. In *Number 318 in Journal of Physics: Conference Series*.

77 Jens H. M. Fransson and Alessandro Talamelli, 2011, Base flow modulations for skin-friction drag reduction. In *Journal of Physics: Conference Series*.

78 Jens H. M. Fransson, 2011, Advanced fluid research on drag reduction in turbulence experiments: AFRODITE.

79 Peter Lenaers, Qiang Li, Geert Brethouwer, Philipp Schlatter, and Ramis Örlü, 2011, Negative streamwise velocities and other rare events near the wall in turbulent flows. In *13th European Turbulence Conference (ETC13): Wall-Bounded Flows And Control Of Turbulence*.

80 Johan Malm, Philipp Schlatter, and Neil D. Sandham, 2011, A vorticity stretching diagnostic for turbulent flows. In *Proc. 7th International Symposium on Turbulence and Shear Flow Phenomena*.

81 Ylva Odemark and Jens H. M. Fransson, 2011 An experimental study of tip vortex instabilities and breakdown.

82 Ylva Odemark and Jens H. M. Fransson, 2011, Wake evolution and trailing vortex instabilities.

83 Johan Ohlsson, Philipp Schlatter, Paul F. Fischer, and Dan S. Henningson, 2011, Stabilization of the spectral-element method in turbulent flow simulations. In *Lecture Notes in Computational Science and Engineering, 76*.

84 Markus Pastuhoff, Nils Tillmark, and P. Henrik Alfredsson, 2011, Wall pressure measurements in a y-junction at pulsating flow using polymer/ceramic pressure sensitive paint. In *Proc. 10th International Symposium on Experimental and Computational Aerothermodynamics of Internal Flows*.

85 Yoann Prigent, Pau Mallol, and Gunnar Tibert, 2011, A classical lamination model of bi-stable woven composite tape-springs. In *Proc. 24th Nordic Seminar on Computational Mechanics*.

86 Alexander Sakowitz and Laszlo Fuchs, 2011, Computation of mixing processes related to EGR. In *Proc. 7th International on Turbulence and Shear Flow Phenomena*.

87 Alexander Sakowitz and Laszlo Fuchs, 2011, LES of the turbulent mixing process in a T-junction with stationary and pulsating inflow conditions. In *Proceedings of the 10th International Symposium on Experimental Computational Aerothermodynamics of Internal Flows*.

88 Gaetano Sardina, Luca Brandt, Philipp Schlatter, Carlo Massimo Casciola, and Dan S. Henningson, 2011, Transport of inertial particles in turbulent boundary layers. In *13th European Turbulence Conference (ETC13): Particles In Turbulence, Transport Processes And Mixing.*

89 A. Sattari, Bengt Fallenius, Jens H. M. Fransson, and M. Sandberg, 2011, PIV visualisation study in a two-dimensional room model with rapid time varying ventilation flow rates. In *ROOMVENT, The 12th International Conference on Air Distribution in Rooms.*

90 Sohrab Shirvan Sattarzadeh, Shahab Shahinfar, Bengt Fallenius, Jens H. M. Fransson, and Alessandro Talamelli, 2011, Transition delay by means of base flow modulations.

91 Philipp Schlatter, Ramis Örlü, Qiang Li, Gert Brethouwer, Arne Johansson, P. Henrik Alfredsson, and Dan Henningson, 2011, Progress in simulations of turbulent boundary layers. In *Proc. 7th International Symposium on Turbulence and Shear Flow Phenomena.*

92 Philipp Schlatter and Ramis Örlü, 2011, Turbulent asymptotic suction boundary layers studied by simulation. In *13th European Turbulence Conference (ETC13): Wall-Bounded Flows And Control Of Turbulence.*

93 Philipp Schlatter, Qiang Li, Geert Brethouwer, Arne V. Johansson, and Dan S. Henningson, 2011, Structure of a turbulent boundary layer studied by DNS. In *Direct and Large-Eddy Simulation VIII.*

94 Philipp Schlatter, Johan Malm, Geert Brethouwer, Arne V. Johansson, and Dan S. Henningson, 2011, Large-scale simulations of turbulence: HPC and numerical experiments. In *2011 Seventh IEEE International Conference on eScience.*

95 Lars-Uve Schrader, David Tempelmann, Luca Brandt, Ardeshir Hanifi, and Dan S. Heninngson, 2011, Excitation of cross-flow vortices by surface roughness on a swept wing.

96 Antonio Segalini, Jens H. M. Fransson, and P. Henrik Alfredsson, 2011, An experimental analysis of canopy flows. In *Journal of Physics: Conference Series.*

97 Antonio Segalini, Jens H. M. Fransson, J.-Å. Dahlberg, and P. Henrik Alfredsson, 2011, Gust structure and generation in canopy flows.

98 Shahab Shahinfar and Jens H. M. Fransson, 2011, Effect of free-stream turbulence characteristics on boundary layer transition. In *Journal of Physics: Conference Series.*

99 Shahab Shahinfar and Jens H. M. Fransson, 2011, Free-stream turbulence boundary layer transition.

100 Shahab Shahinfar and Jens H. M. Fransson, 2011, Natural by-pass boundary layer transition.

101 Thomas Sinn, Malcolm McRobb, Adam Wujek, Jerker Skogby, Mengqi Zhang, Massimiliano Vasile, Gunnar Tibert, Johannes Weppler, Andrew Feeney, John Russell, Fredrik Rogberg, and Junyi Wang, 2011, Rexus 12 Suaineadh experiment: deployment of a web in microgravity conditions using centrifugal forces. In *IAC 2011: Proc. 62nd International Astronautical Congress.*

102 Alessandro Talamelli and Jens H. M. Fransson, 2011, High amplitude streaks in boundary layers: a new passive mechanism for transition delay.

103 Alessandro Talamelli, Antonio Segalini, Ramis Örlü, Philipp Schlatter, and P. Henrik Alfredsson, 2011, A method to correct third and fourth order moments in turbulent flows. In *Journal of Physics: Conference Series.*

104 David Tempelmann, Lars-Uve Schrader, Ardeshir Hanifi, Luca Brandt, and Dan S. Heninngson, 2011, Numerical study of boundary-layer receptivity on a swept wing. In *Number 2011-3294 in AIAA paper.*

105 Gunnar Tibert, 2011, Design and form-finding analysis of tensegrity power lines. In *Proc. 4th Structural Engineering World Congress.*

106 Y. Tsuji, S. Imahama, Philipp Schlatter, P. Henrik Alfredsson, and Arne Johansson, 2011, Pressure fluctuation in high-Reynolds number turbulent boundary layer: results from experiments and numerical simulations. In *Proc. 7th International Symposium on Turbulence and Shear Flow Phenomena.*

107 E.B. Voronkova and S.M. Bauer and A. Eriksson, 2011, Nonclassical theories of shells in application to soft biological tissues. In *Shell-like Structures — Nonclassical Theories and Applications*, Springer.

108 Stevin van Wyk, Lisa Prahl Wittberg, and Laszlo Fuchs, 2011, Haemodynamics in a 3D 90-degree bifurcation. In *Proc. ECCOMAS Thematic International Conference on Simulation and Modeling of Biological Flows.*

109 Florian von Stillfried, Timea Kekesi, Stefan Wallin, and Arne V. Johansson, 2011, Evaluating vortex generator jet experiments for turbulent flow separation control. In *13th European Turbulence Conference (ETC13): Wall-Bounded Flows And Control Of Turbulence.*

110 Ramis Örlü and Philipp Schlatter, 2011, Inflow length and tripping effects in turbulent boundary layers. In *13th European Turbulence Conference (ETC13): Wall-Bounded Flows And Control Of Turbulence.*

5.3.3 Technical reports (TRITA)

ISSN 0348–467X, ISRN number given below.

111 Bellani, G., 2011, Experimental studies of complex flows through image-based techniques, *Doctoral thesis*, KTH/MEK/TR–11/03–SE.

112 Dalilsafaei, S., 2011, Stiffness modification of tensegrity structures, *Licentiate thesis*, KTH/MEK/TR–11/02–SE.

113 Fallenius B. E. G., 2011, Experimental design and vortex analyses in turbulent wake flows, *Doctoral thesis*, KTH/MEK/TR–11/12–SE.

114 Klets O., 2011, Subject-specific musculoskeletal modeling of the lower extremities in persons with unilateral cerebral palsy, *Licentiate thesis*, KTH/MEK/TR–11/08–SE.

115 Klinkenberg, J., 2011, Stability analysis of channel flow laden with small particles., *Licentiate thesis*, KTH/MEK/TR–11/10–SE.

116 Li Q., 2011, Direct and large-eddy simulations of turbulent boundary layers with heat transfer, *Doctoral thesis*, KTH/MEK/TR–11/11–SE.

117 Malm J., 2011, Spectral-element simulations of turbulent wall-bounded flows including transition and separation, *Doctoral thesis*, KTH/MEK/TR–11/15–SE.

118 Monokrousos A. M., 2011, Optimisation and control of shear flows, *Doctoral thesis*, KTH/MEK/TR–11/08–SE.

119 Pouransari Z. P., 2011, Fundamental studies of non-premixed combustion in turbulent wall jets using direct numerical simulation, *Licentiate thesis*, KTH/MEK/TR–11/09–SE.

120 Rasam A., 2011, Explicit algebraic subgrid-scale stress and passive scalar flux modeling in large eddy simulation, *Licentiate thesis*, KTH/MEK/TR–11/05–SE.

121 Sakowitz A.S., 2011, On the computation of turbulent mixing processes with application to EGR in IC-engines, *Licentiate thesis*, KTH/MEK/TR–11/14–SE.

122 Semeraro O., 2011, Feedback control and modal structures in transitional shear flows, *Licentiate thesis*, KTH/MEK/TR–11/01–SE.

123 Shahinfar S., 2011, Transitional boundary layers caused by free-stream turbulence, *Licentiate thesis*, KTH/MEK/TR–11/06–SE.

124 Tammisola, O., 2011, Numerical stability studies of one-phase and immiscible two-phase jets and wakes, *Doctoral thesis*, KTH/MEK/TR–11/07–SE.

125 Tempelmann D., 2011, Receptivity of crossflow-dominated boundary layers, *Doctoral thesis*, KTH/MEK/TR–11:13–SE.

126 van Wyk S., 2011, Unsteadiness of blood flow in 90-degree bifurcations, *Licentiate thesis*, KTH/MEK/TR–11/16–SE.

5.4 Seminars at KTH Mechanics

Seminars given at KTH

January 20 Lailai Zhu, KTH Mechanics
A numerical study on hydrodynamics of swimming micro-organisms in polymeric fluids.

January 26 Fan Zou, Gotland University College
Estimation of wind energy production for offshore wind farm — method validation of wind farm wake models using WindSim.

February 9 Johan Malm, KTH Mechanics
Spectral elements for turbulence simulations in complex geometries.

February 17 Mihailo Jovanovic, University of Minnesota
Dynamics and control of wall-bounded shear flows.

February 18 Onofrio Semeraro, KTH Mechanics
Feedback control and modal structures in transitional shear flows.

February 24 Joy Klinkenberg, KTH Mechanics
Stability analysis of a particle laden flow.

March 17 Peter Schmid, LadHyX, Ecole Polytechnique, France
Flow control design by Galerkin projection and system identification.

March 31 Gabriele Bellani, KTH Mechanics
Experimental study of large particles in homogeneous isotropic turbulence.

April 7 Sohrab Sattarzadeh Shirvan, KTH Mechanics
Experimental study of complex pipe flows.

April 7 Outi Tammisola, KTH Mechanics
Global stability of plane co-flow wakes and jets: changes with confinement and surface tension.

April 28 Ruth-Anne Lambert, KTH Mechanics
The role of flap bending and rotation on fluid mixing in a microchannel.

May 5 Yoshitsugu Naka, Laboratoire de Mécanique de Lille
Velocity-pressure correlation measurement in a turbulent boundary layer.

May 12 Axel Brandenburg, Nordita
Turbulent transport in astrophysical flows.

May 19 Gabriele Bellani, KTH Mechanics
Experimental studies of complex flows through image-based techniques.

May 24 Carl Christian Kjelgaard Mikkelsen, Umeå University
Mathematics for analysis of narrow-banded linear system solvers.

May 25 Matthäus Bäbler, KTH Chemical Engineering and Technology
Aggregation and breakup of colloidal particles in turbulent flows.

May 25 Qiang Li, KTH Mechanics
Large-eddy simulation of a turbulent boundary layer with passive scalar transport.

May 26 Hassan Nagib, KTH Mechanics
Asymptotic similarity and pressure gradient effects in turbulent boundary layers.

May 26 Laurette S. Tuckerman, PMMH-ESPCI
How to turn an exponential into an inverse.

May 27 Axel Kierkegaard, KTH Aeronautical and vehicle engineering
Frequency domain linearized Navier-Stokes equations methods for low Mach number internal aeroacoustics.

May 30 Amin Rasam, KTH Mechanics
Explicit algebraic subgrid-scale stress and passive scalar flux modeling in large eddy simulation.

June 9 Berend van Wachem, Imperial College
Modeling of gas-solid turbulent flows with non-spherical particles.

June 9 Shahab Shahinfar, KTH Mechanics
Transitional boundary layers caused by free-stream turbulence.

June 13 Outi Tammisola, KTH Mechanics
Numerical stability studies of one-phase and immiscible two-phase jets and wakes.

June 14 Rama Govindarajan, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore
Stability of density stratified vortical flows.

August 25 Avraham Seifert, Tel Aviv University
Active flow control of wind turbines and heavy vehicles.

August 29 Sven Grundmann, TU Darmstadt
Experimental transition control using body forces.

September 5 Laszlo Fuchs, KTH Mechanics
Icing and de-icing of wind-turbine blades.

September 8 Yukio Kaneda, Nagoya University
Two kinds of universalities in the small-scale statistics of turbulence at high Reynolds number.

September 22 Milos Ilak, KTH Mechanics
Bifurcation and stability analysis of a jet in crossflow.

September 28 Zeinab Pouransari, KTH Mechanics
Fundamental studies of non-premixed combustion in turbulent wall jets using direct numerical simulation.

September 29 David Tempelmann, KTH Mechanics
Receptivity studies of a swept-wing boundary-layer.

October 6 Cristian Marchioli, University of Udine
Predicting particle preferential concentration in LES turbulent flows: open issues of Lagrangian tracking and possible remedies.

October 7 Joy Klinkenberg, KTH Mechanics
Stability analysis of channel flow laden with small particles.

October 10 Qiang Li, KTH Mechanics
Direct and large-eddy simulations of turbulent boundary layers with heat transfer.

October 27 Martin Bees, University of Glasgow
Bioconvection, flowfields and the transport of biased swimming algae in a flow in a tube.

November 3 Novak Elliott, Curtin University, Australia
Syringomyelia and snoring: a pair of fluid-structure interaction problems in physiology.

November 10 Francesco Picano, KTH Mechanics
Transport of inertial particles in turbulent jets.

November 11 Bengt Fallenius, KTH Mechanics
Experimental design and vortex analyses in turbulent wake flows.

December 2 Alexander Sakowitz, KTH Mechanics
On the computation of turbulent mixing processes with application to EGR in IC-engines.

December 8 Stevin van Wyk, KTH Mechanics
Unsteadiness of blood flow in 90-degree bifurcations.

December 8 Anatoli Tumin, University of Arizona
Stability of high-speed chemically non-equilibrium boundary layers.

December 9 David Tempelmann, KTH Mechanics
Receptivity of crossflow-dominated boundary layers.

December 16 Johan Malm, KTH Mechanics
Spectral-element simulations of turbulent wall-bounded flows including transition and separation.