# KTH Mechanics

SE-100 44 Stockholm, Sweden

# Activity Report 2008

## Contents

## Preface

This report gives a short overview of the structure and activities at the department of Mechanics, KTH during the year of 2008. More information may be found at the department web site http://www.mech.kth.se.

The teaching activity of the department during 2008 included basic, intermediate, advanced-level as well as graduate courses in mechanics, fluid mechanics and structural mechanics given for students and programmes at almost all schools at KTH.

The scientific activity of the department resulted in the defences of five doctoral theses and presentations of five licentiate theses during 2008. The publication list for the department this year consists of 51 publications in archival journals, 34 publications in conference proceedings and 13 internal reports, for a total of 98 publications.

Stockholm in May 2009

Dan Henningson, department chairman

Anders Eriksson, department vice chairman

# 1 Introduction

The department of Mechanics is one of the seven departments within the School of Engineering Sciences at KTH. The Department had 97 employees and a turnaround of about 65 MSEK during the year 2008.

Prof. Dan Henningson is the chairman of the department, with Docent Nicholas Apazidis as the vice chairman for the first half of the year; during the second half, Prof. Anders Eriksson took the latter role. 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: Henrik Alfredsson, Gustav Amberg, Nicholas Apazidis, Fritz Bark, Anders Eriksson, Hanno Essén, Laszlo Fuchs, Dan Henningson (chairman), Arne Johansson, Hans Silverhag.

The undergraduate teaching activity at the department offers a comprehensive course selection in basic mechanics attended by 1 200 students, in fluid mechanics with 400 students and in structural and advanced mechanics with 200 students. With about 100 staff, including 12 professors and 13 associate professors, the department is large enough to provide an excellent research environment in a wide range of research areas for about 40–50 graduate students. During the year 2008, five of the graduate students defended their PhD theses and five presented their Licentiate theses.

The department also, together with the Department of Solid Mechanics, serves as host for the International Masters Programme in Engineering Mechanics, which offers a broad spectrum of high level courses in solid, structural and fluid mechanics. Dr. Gunnar Tibert serves as the coordinator of this programme.

Mechanics of solids, 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 of a human body (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 Prof. 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 Prof. Dan Henningson) studies how and why orderly laminar flow transitions to chaotic turbulent flow occur. Often large scale numerical experiments are 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 Prof. Henrik Alfredsson) deals with five main research areas at present: fundamental studies of transition to turbulence 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 Cicero, Center for Internal Combustion Engine Research Opus, where gas management of IC engines are studied with the aim to increase efficiency and also significantly reduce emissions such as $CO_2$, $NO_x$ and unburned hydrocarbons. 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 Prof. 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 system. The group has close collaboration and common areas of interest with other groups at the department, in particular the Fluid physics group and KTH Cicero.

- The *Turbulence group* (headed by Prof. 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), pressure measurements in high Reynolds number flows and measurements in high Reynolds number turbulent boundary

layers. Recent developments also include studies of combustion in turbulent flows. Another growing research area is the study of geophysical flows through theoretical development and simulations, in particular flows subjected to strong stratification. A new research subject is the study of quasi-geostrophic turbulence, i.e., large scale turbulence strongly affected by the combined effects of rotation and stratification.

- The group of *Physio-chemical fluid mechanics* (headed by Prof. 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.

- The research group for *Fluid mechanics of the process industries* (headed by Prof. Fritz Bark) investigates applied problems, often in combination with other disciplines in the engineering sciences. Examples of research themes are multi-component, multiphase non-isothermal flow in polymer electrolyte fuel cells, electro permutation assisted by ion exchange textiles, multiphase hydrodynamic/electrochemical modeling of pickling of steel and investigations of the mechanics of fiber suspensions.

- In the group of *Theoretical and applied mechanics* (headed by Dr. 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.

## *Personnel related matters during 2008*

### *New appointments during 2008*

Hassan Nagib, IIT, Chicago was appointed affiliated professor at the department.
Rebecca Lingwood, Oxford University was appointed affiliated professor at the department.
Daniel Söderberg, STFI/Packforsk (now Innventia) was appointed adjoint professor at the department.
Heide Hornk and Nina Bauer were employed in our administration, and Göran Rådberg in our laboratory as technician.

Nine new graduate students started their PhD. educations at the department during 2008.

We had several post-docs and guest students at the department during the year.

### *Awards, prizes and funding*

Jens Fransson was awarded the Göran Gustafsson prize.
Luca Brandt was appointed as a VR-supported researcher.

The department was successful in obtaining funding from many different sources. In addition to a continued funding from VR, new funding was obtained from,

e.g., STINT (Alfredsson), STEM (Lundell), Vinnova (Amberg), Ljungbergs Utbildningsfond (Söderberg), and KAW (Alfredsson, Söderberg).

The department was one of the main partners of the consortium around a large mainframe computer ('Ekman'), together with the meteorology department of Stockholm University and SMHI. The department was also one of the main partners in the organization of an international 'Turbulence measurement jamboree'.

*Miscellaneous*

The whole KTH was subjected to a 'Research assessment exercise' during the year, taking major efforts from all academic staff. The fluid mechanics assessment unit came out with overall high marks. The mechanics and biomechanics unit got high academic marks.

The engineering mechanics master's programme was an attractive choice for a considerably increased number of international students. With a new admission strategy, we obtained a higher number of students of very good potential.

Anders Eriksson followed Nicholas Apazidis as department vice chairman from 1 July. Nicholas at the same time got a role with a strategic responsibility for teaching development.

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

*Common department activities*

The teachers of the department had a two-day workshop on teaching issues in Lidingö 10–11 April.

The academic year 2007/2008 was ended by a boat trip and a dinner on m/s Askungen in the Stockholm Archipelago on June 10. The department also gathered for a Christmas dinner at restaurant Ulla Winblad on December 10.

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

# 2 Personnel

## Professors

- Alfredsson Henrik, Ph.D. in mechanics, KTH 1983, and Docent at KTH 1985. Prof. of fluid physics 1989. Director of CICERO.
- Amberg Gustav, Ph.D. in fluid mechanics, KTH 1986, and Docent at KTH 1990. Prof. of fluid mechanics 1999. Dean of the school of Engineering sciences, since December 1, 2004.
- Bark Fritz, Ph.D. in applied mechanics, KTH 1974. Prof. of hydromechanics, 1985.
- Eriksson Anders, Ph.D. in steel structures, KTH 1981, and Docent at KTH 1988. Prof. of structural mechanics 1992. Vice president of KTH, 1999–2007. Acted as president of KTH during August–November 2007. Department vice chairman 2008–.
- Fuchs Laszlo, Ph.D. in gas dynamics, KTH 1977, and Docent at KTH 1980. Prof. of fluid mechanics at LTH 1994–2007. Prof. of fluid mechanics at KTH 2007.
- Henningson Dan, Ph.D. in mechanics, KTH 1988, and Docent at KTH 1992. Prof. of fluid mechanics 1999. Department chairman since July 2005. Director of Linné Flow Center
- Johansson Arne, Ph.D. in mechanics, KTH 1983, and Docent at KTH 1984. Prof. of mechanics 1991. Secretary general for Natural and Engineering Sciences at the Swedish Research Council (VR) since July 2004 (75% at VR, 25% at KTH).

## Adjunct professors

- Hanifi Ardeshir, Ph.D. in fluid mechanics, KTH 1995, and Docent at KTH 2003. Adj. Prof. of fluid mechanics since 2005 (20% at KTH, 80% FOI).
- Thomasson Per-Olof, Ph.D. in steel structures, KTH 1978, and Docent at KTH 1978. Adj. Prof. of applied structural mechanics 2002–2008 (20% at KTH, 80% at Tyréns).
- Söderberg Daniel, Ph.D., KTH 1999. Adj. Prof. of process fluid mechanics since 2008 (20% at KTH).

## Professors emeriti

- Enflo Bengt, Ph.D. and Docent in theoretical physics, Univ. of Stockholm 1965. 'Biträdande professor' at KTH 1996. Retired in 2000.
- Lesser Martin, Ph.D. in aerospace engineering, Cornell, Docent and Prof. at LTU. Prof. of mechanics at KTH 1987. Retired in 2005.

## Affiliated Professors

- Nagib Hassan, IIT, Chicago.
- Lingwood Rebecca, Oxford University.

## Senior Lecturers

- Apazidis Nicholas, Ph.D. in mechanics, KTH 1985, and Docent at KTH 1994. Department vice chairman 2005–2008.
- Burden Anthony, Ph.D. in applied mathematical physics, CTH 1984.
- Dahlkild Anders, Ph.D. in mechanics, KTH 1988, and Docent at KTH 1992. Director of graduate studies.
- Essén Hanno, Ph.D. in theoretical physics, Univ. of Stockholm 1979, and Docent 1986. Director of undergraduate studies.
- Hsieh Richard, Ph.D. in mechanics, KTH 1978, and Docent at KTH 1980.
- Karlsson Arne, TeknL. (50 % at KTH Mechanics).
- Karlsson Göran, Ph.D. in quantum chemistry, Univ. of Uppsala 1970.
- Lindborg Erik, Ph.D. in Mechanics, KTH 1996, and Docent at KTH 2001. Director of undergraduate studies in fluid mechanics.
- Nordmark Arne, Ph.D. in mechanics, KTH 1992, and Docent at KTH 1999.
- Nyberg Christer, Ph.D. in mechanics, KTH 1979.
- Söderholm Lars, Ph.D. and Docent in theoretical physics, Univ. of Stockholm, 1970.
- Thor Lars, Ph.D. in mechanics, KTH 1973. Retired in 2008.
- Thylwe Karl-Erik, Ph.D. in theoretical physics, Univ. of Uppsala 1981, and Docent 1987.

## Lecturers, research associates and researchers

- Battini Jean-Marc, Ph.D. in structural mechanics, KTH 2002. Employed until 2008.
- Brandefelt Jenny, Ph.D. in meteorology, Univ. of Stockholm 2005.
- Brandt Luca, Ph.D. in fluid mechanics, KTH 2003, and Docent at KTH 2008.
- Brethouwer Geert, Ph.D. in fluid mechanics, TU Delft 2001.
- Do-Quang Mihn, Ph.D. in fluid mechanics, KTH 2004.

- Fransson Jens, Ph.D. in fluid mechanics, KTH 2003, and Docent at KTH 2006.
- Gutierrez Farewik Elena, Ph.D. in orthopedics, KI 2003, and Docent at KTH 2007.
- Lundell Fredrik, Ph.D. in fluid mechanics, KTH 2003, and Docent at KTH 2008.
- Maxe Gunnar, MSc.
- Tibert Gunnar, Ph.D. in structural mechanics, KTH 2002.
- Tillmark Nils, Ph.D. in fluid mechanics, KTH 1995. Responsible for the department's lab. facilities.
- Schlatter Philipp, Ph.D. in fluid mechanics, ETH 2005.

## Adjunct Lecturers

- Wallin Stefan, Ph.D. 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*: Prof. Alessandro Talamelli, Univ. of Bologna, Italy (3 months).
- *Post-doc*: Dr. Takahiro Tsuakahara, Tokyo Science University (April 2007–April 2008).
- *Post-doc*: Dr. Yohann Duguet, Ecole centrale de Lyon, Ecully, France.
- *Post-doc*: Dr. Lisa Prahl, Lund University.
- *Post-doc*: Dr. Likang Yang, Zhejiang University of Science and Technology, China.
- *Visiting doctoral student*: Mr. Ali Farzadi (June 2007–December 2008).
- *Visiting doctoral student*: Mr. Antonio Segalini, Universita di Bologna (October 2007–May 2008).
- *Visiting doctoral student*: Mr. Shirko Faroughi, Tehran, Iran (October 2008–).

## Technical and administrative staff

- Ekstrand Pär, MSc., system manager.
- Hornk, Heide, financial manager.
- Karlström Joakim, tool maker.
- Olofsson Anne-Mari, course administrator.
- Rådberg Göran, tool maker.
- Silverhag Hans, head of administration.
- Skult Stefan, administrative assistant.
- Wester Ingunn, human resource manager.

Changes in the department personnel in recent years are summarized in the following table

| **Number of employees during 2001-2008** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Position | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | **2008** |
| Prof./Adj. Prof. | 9 | 11 | 11 | 10 | 10 | 10 | 11 | **11** |
| Lect./Adj. Lect. | 14 | 15 | 16 | 16 | 16 | 16 | 15 | **14** |
| Ass. lect./Researcher/Adjunct | 7 | 7 | 9 | 11 | 12 | 12 | 15 | **15** |
| Technical/adm staff | 9 | 9 | 10 | 10 | 9 | 9 | 9 | **7** |
| Guest Res./Post-docs | | | 3 | 5 | 5 | 4 | 6 | **5** |
| Doctoral students | 48 | 45 | 46 | 42 | 38 | 37 | 40 | **36** |
| External doct. stud. | 14 | 12 | 6 | 11 | 8 | 6 | 5 | **9** |
| Total | 101 | 99 | 101 | 105 | 98 | 94 | 101 | **97** |

| Active graduate students at KTH Mechanics during 2008 | | | | | |
|---|---|---|---|---|---|
| Name | Affiliation | Adv. | Start | TeknL | TeknD |
| Ahlberg Charlotte | Mech | FL | 04/2007 | | |
| Amer Malik | Mech | GA | 11/2008 | | |
| Bagheri Shevrin | Mech | DH | 04/2006 | 06/2008 | |
| Bellani Gabrielle | Mech | FL/DS | 02/2006 | 10/2008 | |
| Bodin Olle | Mech | LF | 09/2006 | | |
| Byström Martin | Mech | DH | 02/2005 | 06/2007 | |
| Carlsson Allan | Mech | DS/FL | 01/2005 | 02/2007 | |
| Carlsson Andreas | Mech | GA | 12/2007 | | |
| Dalilsafaei Seif | Mech | AE/GT | 11/2008 | | |
| Fallenius Bengt | Mech | JF/HAL | 04/2006 | | |
| Fällman Monika | Mech | FB/DS | 04/2003 | | |
| Gärdsback Mattias | Mech | AE/GT | 03/2004 | 02/2007 | 12/2008 |
| Hellström Fredrik | GM PT | LF | 09/2005 | 03/2008 | |
| Hyensjö Marko | Metso | AD | 09/2001 | 04/2005 | 06/2008 |
| Ivanell Stefan | Mech/HGO | DH | 10/2003 | 05/2005 | |
| Kjellander Malte | Mech | NA/NT | 05/2007 | | |
| Klets Olesya | Mech | AE/LGF | 09/2008 | | |
| Kosterina Natalia | Mech | AE | 11/2006 | | |
| Kurian Thomas | Mech | HAL/JF | 08/2005 | | |
| Laurantzon Fredrik | Mech | HAL/NT | 06/2007 | | |
| Li Qiang | Mech | DH | 05/2007 | | |
| Lin Yuan | Mech | GA | 01/2004 | 06/2006 | 06/2008 |
| Ljubimova Darja | Mech | AE | 11/2002 | 12/2005 | |
| Lögdberg Ola | Scania | HAL/JF | 09/2003 | 10/2006 | |
| Manda Krishnagoud | Mech | AE | 10/2008 | | |
| Marstorp Linus | Mech | AJ/GB | 02/2004 | 04/2006 | 06/2008 |
| Mellgren Niklas | Mech/FLA | MV | 05/2003 | | |
| Monokrousos Antonios | Mech | DH | 02/2007 | | |
| Muld Tomas | Mech | DH/GE | 04/2007 | | |
| Ohlsson Johan | Mech | DH | 03/2007 | | |
| Pettersson Robert | Mech | AE/LGF | 09/2006 | | |
| Sakowitz Aleksander | Mech | LF | 12/2008 | | |
| Schrader Lars-Uve | Mech | DH | 04/2006 | 11/2008 | |
| Semerano Onofrio | Mech | DH | 10/2008 | | |
| Shahinfar Shahab | Mech | JF/HA | 06/2008 | | |
| von Stillfried Florian | Mech | AJ/SW | 09/2007 | | |
| Strömgren Tobias | Mech | GA/AJ | 04/2005 | 03/2008 | |
| Svärd Anna | GM/PT | HAL/NT | 09/2005 | | |
| Tahir Abdul Malik | Mech | GA | 08/2008 | | |
| Tammisola Outi | Mech | DS/FL | 06/2006 | | |
| Tempelmann David | Mech | DH | 03/2007 | | |
| Vallgren Andreas | Mech | EL | 02/2007 | | |
| Velter Guillaume | Mech | AJ/GB | 08/2008 | | |
| Wang Ruoli | Mech | LGF/AE | 06/2007 | | |
| Åkervik Espen | Mech | DH | 03/2004 | 03/2007 | 12/2008 |
| Örlü Ramis | Mech | HAL/NT | 02/2004 | 10/2006 | |

# 3 Economy

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

**KTH Mekanik, resultat**

| RESULTATRÄKNING 2008 (kr) | GRU | FOFU | Totalt |
|---|---|---|---|
| Gruanslag | 15,579,892 | 0 | 15,579,892 |
| Fofuanslag | 0 | 25,206,054 | 25,206,054 |
| Bidrag fr externa finansiärer | 0 | 33,435,561 | 33,435,561 |
| Övriga intäkter | 250,473 | 1,051,009 | 1,301,482 |
| Finansiella intäkter | 0 | 855,525 | 855,525 |
| SUMMA INTÄKTER | 15,830,365 | 60,548,149 | 76,378,514 |
| Personalkostnader | 10,977,119 | 29,221,211 | 40,198,330 |
| Lokalkostnader | 1,379,905 | 7,179,339 | 8,559,244 |
| Resor och traktamenten | 61,511 | 1,913,169 | 1,974,680 |
| Drift och övrigt | 415,121 | 2,786,244 | 3,201,365 |
| Gemensamma kostnader | 1,831,310 | 7,711,741 | 9,543,051 |
| Avskrivningar | 44,390 | 1,210,304 | 1,254,694 |
| Finansiella kostnader | 74 | 1,213 | 1,287 |
| SUMMA KOSTNADER | 14,709,430 | 50,023,221 | 64,732,651 |
| ÅRETS KAPITALFÖRÄNDRING | 1,120,935 | 10,524,928 | 11,645,863 |

| RESULTATRÄKNING (k | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|
| Gruanslag | 10,292,988 | 12,324,322 | 14,634,440 | 14,722,646 | 14,519,201 | 16,088,607 | 15,783,902 | 14,779,184 | 15,579,892 |
| Fofuanslag | 15,708,352 | 20,753,146 | 20,272,936 | 20,381,213 | 19,070,258 | 20,294,169 | 22,231,335 | 23,354,808 | 25,206,054 |
| Externa intäkter | 24,355,272 | 28,464,614 | 30,705,935 | 31,577,133 | 30,276,021 | 26,586,224 | 24,991,127 | 24,593,559 | 35,592,568 |
| *SUMMA INTÄKTER* | *50,356,612* | *61,542,082* | *65,613,311* | *66,680,992* | *63,865,480* | *62,969,001* | *63,006,364* | *62,727,551* | *76,378,514* |
| *SUMMA KOSTNADER* | *52,922,858* | *57,673,596* | *61,807,300* | *64,157,643* | *65,447,867* | *64,506,333* | *63,266,942* | *63,664,773* | *64,732,651* |
| ÅRETS KAPITALFÖRÄ | -2,566,246 | 3,868,486 | 3,806,011 | 2,523,349 | -1,582,387 | -1,537,332 | -260,578 | -937,222 | 11,645,863 |

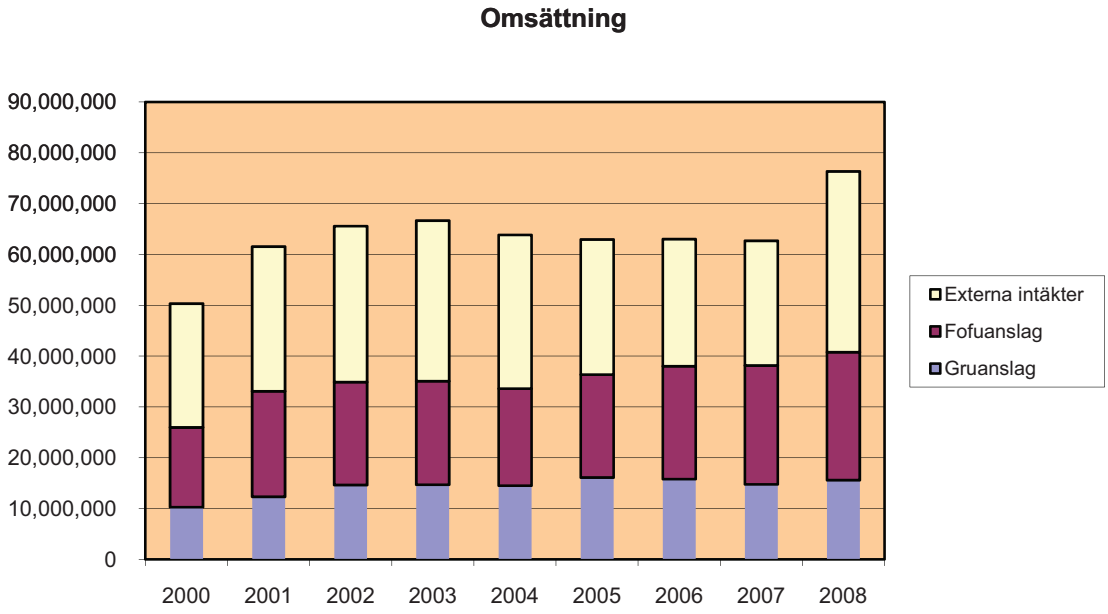


Figure 1: Turnaround in SEK during 2000–2008

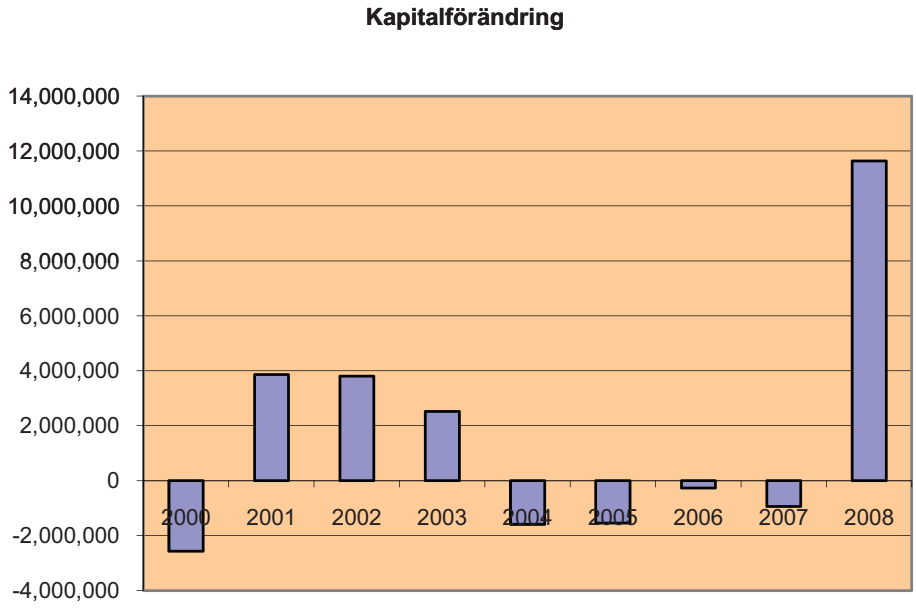


Figure 2: The surplus/deficit in SEK during 2000–2008

# 4 Teaching activities

## 4.1 Undergraduate courses

These data refer to the academic year 2008/9.

| Basic courses mechanics | | | | |
|---|---|---|---|---|
| Progr.: Year | Code | Credit | Name | Responsible |
| 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 | Bark |
| MT : 1 | SG1102 | 6,0 | Mechanics, Smaller course | Maxe |
| 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 | SG1130 | 9,0 | 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 | SG1130 | 6,0 | Mechanics II | Bark |
| **Advanced courses** | | | | |
| All : 4 | SG2122 | 6,0 | Continuum mechanics | Söderholm |
| All : 4 | SG2123 | 6,0 | Math. methods of mechanics | Söderholm |
| All : 4 | SG2126 | 7,5 | Nonlinear dynamics | Nordmark |
| All: 4 | SG2127 | 3 | Research methodology in mechanics | Essén |
| All : 3 | SG2150 | 7,5 | Rigid body dynamics | Essén |
| **Advanced courses structural mechanics** | | | | |
| S : 3 | SG1801 | 7,5 | Structural mechanics, basic | Eriksson |
| S : 4 | SG2802 | 7,5 | Membranes, plates and FEM | Tibert |
| S : 4 | SG2803 | 7,5 | Num. modelling and simulation | Eriksson |
| All : 4 | SG2850 | 7,5 | Finite element methods | Eriksson |
| 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 | Burden |
| T : 2 | SG1217 | 6,0 | Fluid mechanics | A. Karlsson |
| M, P : 3 | SG1220 | 6,0 | Fluid mechanics for engineers | A. Karlsson |
| **Advanced courses fluid mechanics** | | | | |
| All : 4 | SG1213 | 3,0 | Appl. comp. fluid dynamics | Wallin |
| All : 4 | SG1215 | 7,5 | Compressible flow | Alfredsson |
| All : 4 | SG2211 | 6,0 | Vehicle aerodynamics | Talamelli |
| All : 3 | SG2214 | 7,5 | Fluid mechanics, General course | Dahlkild |
| All : 4 | SG2219 | 7,5 | Advanced compressible flows | HA, NA, AD, NT |

| | | | | |
|---|---|---|---|---|
| All : 4 | SG2221 | 7,5 | Wave motion and stability | Fransson |
| F : 3 | SG2223 | 9,0 | Fluid mechanics | Lindborg & Fransson |
| All : 4 | KF2050 | 6,0 | Paper process technology | Lundell |

The numbers of students based on hås/håp: 8*(hås+håp)/2 during the years 2002-2008 are summarized in the following table

| **Number of students during 2002-2008** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Courses | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | **2008** |
| Basic mechanics | 1744 | 1496 | 1504 | 1442 | 1371 | 1403 | **1232** |
| Upper level mechanics courses | 48 | 72 | 96 | 52 | 48 | 42 | **35** |
| Fluid mechanics | 288 | 408 | 352 | 514 | 425 | 363 | **367** |
| Structural mechanics | 372 | 317 | 262 | 183 | 146 | 133 | **179** |

## 4.2 Master's thesis projects

| **Master's theses during 2008** | | |
|---|---|---|
| Name | Title | Advisor |
| Fedina, E. | Numerical Simulation of Vertical Diffusion in Stratified Turbulence | E. Lindborg |
| Wallin, M. | Charging strategies for plug-in hybrid vehicles | H. Essén |
| Shkury, E. | Numerical Study of Drag Reduction in Boundary Layers with Vortex Generators | P. Schlatter |
| Amin, S. | Transition to Turbulence of a Three Dimensional Boundary Layer Subjected to Free-Stream Turbulence | L. Brandt |
| Göras, A. | Check Valves within Dewatering Applications | H. Alfredsson |
| Clavet, T. | Modeling of the hydraulic system in a dishwasher | L. Brandt |
| Wickman, C. | Heat Transfer in Processing Components | A. Dahlkild |
| Lindberg, J. | Analys av kylarupphängning "P"-paket för 5-cylindriga motorer | A. Nordmark |

| | | |
|---|---|---|
| Odemark. Y. | LES beräkningar på termisk omblandning i ett T-format grenrör | H. Alfredsson |
| Stålbom, M. | Musculoskeletal system simulations to analyse muscle forces and movement pattern | A.Eriksson |
| D´Alberto, L. | Instantanous temperature measurements in turbulent flows – Frequency compensation schemes and wire diameter effects | H. Alfredsson |
| Enjalbert, N.T. | A theoretical and numerical investigation of turbulent reacting jets in glass furnaces | A. Burden |

## 4.3 Graduate courses

During 2008 the following graduate courses ('forskarutbildningskurser') were given. In addition several reading courses were also given.

- SG3105 Fluid mechanics for graduate students (Lindborg)
- SG3112 Turbulence (Burden)
- SG3113 Advanced compressible flow (Alfredsson, Apazidis, Dahlkild, Tillmark)
- SG3114 Numerical methods in fluid mechanics (Henningson, Hanifi)
- SG2221 Wave motions and hydrodynamic stability (Brandt, Fransson)

Within the Linneaus graduate school, an advanced course in Turbulence boundary layers was given with Alfredsson and Brandt as organizers. A number of prominent international lecturers were invited and gave, together with Profs. Alfredsson and Johansson, about 20 hours of high profile lectures.

# 5 Research activities

## 5.1 Doctoral theses defended 2008

**Marko Hyensjö**

*Thesis title:* Fibre Orientation Modelling Applied to Contracting flows Related to Papermaking
*Date:* June 5, 2008
*Faculty opponent:* Prof. Markku Kataja, University of Jyväskylä
*Evaluation committee:* Prof. Bengt Andersson, Chalmers, Prof. Staffan Toll, Chalmers, Docent Anna-Karin Tornberg, KTH
*Main advisor:* Docent Anders Dahlkild

**Yuan Lin**

*Thesis title:* Modeling of dielectrophoresis in micro and nano systems
*Date:* June 11, 2008
*Faculty opponent:* Prof. Hywel Morgan, University of Southampton
*Evaluation committee:*
*Main advisor:* Prof. Gustav Amberg

**Linus Marstorp**

*Thesis title:* Modelling of subgrid-scale stress and passive scalar flux in large eddy simulations of wall bounded turbulent flows
*Date:* June 13, 2008
*Faculty opponent:* Prof. Pierre Comte, Institut National Polytechnique de Genoble
*Evaluation committee:* Dr Johan Hoffman, KTH, prof. Xue-Song Bai, LTH, Dr Christer Fureby, FOI
*Main advisor:* Prof. Arne Johansson

**Espen Åkervik**

*Thesis title:* Global stability and feedback control of boundary layer flows
*Date:* December 5, 2008
*Faculty opponent:* Professor Dwight Barkley, University of Warwick
*Evaluation committee:* Prof. Anders Forsgren, KTH, Docent Johan Hoffmann, KTH, Dr Björn Anders Pettersson-Reif, FFI Norway & Chalmers
*Main advisor:* Prof. Dan Henningson

**Mattias Gärdsback**

*Thesis title:* Deployment Control of Spinning Space Webs and Membranes
*Date:* December 8, 2008
*Faculty opponent:* Dr. Thomas W. Murphey, Air Force Research Laboratory, USA
*Evaluation committee:* Prof. Elling W. Jacobsen, KTH, Dr. Reijo Kouhia, Helsinki University of Technology, Dr. Sven Grahn, Swedish Space Corporation.
*Main advisor:* Prof. Anders Eriksson and Dr. Gunnar Tibert

## 5.2 Licentiate theses presented 2008

**Tobias Strömgren**

*Thesis title:* Modelling of turbulent gas-particle flow
*Date:* March 12, 2008
*External examiner:* Docent Johan Revstedt, LTH
*Main advisor:* Prof. Gustav Amberg.

**Fredrik Hellström**

*Thesis title:* Numerical computations of the unsteady flow in a radial turbine
*Date:* March 28, 2008
*External examiner:* Docent Jonas Bredberg,
*Main advisor:* Prof. Laszlo Fuchs.

**Shervin Bagheri**

*Thesis title:* Stability analysis and control design of spatially developing flows
*Date:* June 5, 2008
*External examiner:* M. Berggren, UU
*Main advisor:* Prof. Dan Henningson.

**Gabriele Bellani**

*Thesis title:* Velocity measurements in a fiber suspension flow: formation of a fiber network
*Date:* October 29, 2008
*External examiner:* Prof. Staffan Lundström, LTU
*Main advisor:* Dr. Fredrik Lundell.

**Lars-Uve Schrader**

*Thesis title:* Receptivity of Boundary Layers under Pressure Gradient
*Date:* November 14, 2008
*External examiner:* Dr. Tamer Zaki, Imperial College, London
*Main advisor:* Docent Luca Brandt.

## 5.3 Publications 2008

### 5.3.1 Publications in archival journals

1 Amberg G., Do-Quang M., 2008, Thermocapillary convection and phase change in welding, *Int. J. Numerical Methods for Heat & Fluid Flow*, **18**, 378.

2 Bark F.H., Vynnycky M., 2008, A note on electrolysis with forced convection at large Peclet number in a channel with an excess of supporting electrolyte, *Russ. J. Electrochem.*, **44**, 470-478.

3 Battini J.-M., 2008, A non-linear corotational 4-node plane element, *Mech. Res. Comm.*, **35**, 408–413.

4 Battini J.-M., 2008, A rotation-free corotational plae beam element for non-linear analyses, *Int. J. Num. Meth. Eng.*, **75**, 672–689.

5 Borg K., Söderholm L.H., 2008, Orbital effects of the Magnus force on a spinning spherical satellite in a rarefied atmosphere, *Eur J. Mech. B/Fluids*, **27**, 623-31.

6 Brandefelt J., Körnich H., 2008, Northern hemisphere stationary waves in future climate projections, *J. Climate*, **21**, 6341–6353.

7 Brandt L., De Lange H.C., 2008, Streak interactions and breakdown in boundary layer flows, *Phys. Fluids*, **20**, 024107, 1-16.

8 Brethouwer G., Lindborg E., 2008, Passive scalars in stratified turbulence, *Geophys. Res. Lett.*, **35**, L06809.

9 Brown S., Mellgren N., Vynnycky M., Lindbergh G., 2008, Impedance as a tool for investigating aging in lithium-ion porous electrodes: II. Positive electrode examination, *J. Electrochem. Soc.*, **155**, A320–A338.

10 di Bernardo M., Nordmark A., Olivar G., 2008, Discontinuity-induced bifurcations of equilibria in piecewise-smooth and impacting dynamical systems, *Physica D*, **237**, 119–136.

11 di Bernardo M., Budd C J, Champneys A.R., Kowalczyk P., Nordmark A., Olivar G., Piiroinen P T, 2008, Bifurcations in Non-smooth Dynamical Systems, *SIAM Review*, **50(4)**, 629-701.

12 Do-Quang M., Amberg G., 2008, Simulation of free dendritic crystal growth in a gravity environment, *J. Comput. Phys.*, **227**, 1772.

13 Do-Quang M., Amberg G., Pettersson, C.-O., 2008, Modeling of the adsorption kinetics and the convection of surfactants in a weld pool., *J. Heat Transfer*, **130**, 092102.

14 Duguet Y., Willis P., Kerswell R., 2008, Transition in pipe flow: the saddle structure on the boundary of turbulence, *J. Fluid Mech.*, **613**, 255-274.

15 Duguet Y., Pringle C.T., Kerswell R., 2008, Relative periodic orbits in transitional pipe flow, *Phys. Fluids*, **20**, 114102.

16 Eliasson V., Henshaw W.D., Appelö D., 2008, On cylindrically converging shock waves shaped by obstacles, *Physica D: Nonlinear phenomena*, **237**, 2203–2209.

17 Eriksson A., 2008, Optimal simulations of musculoskeletal posture and movement, *Comp. Exp. Simul. Eng. Sci.*, **1**, 39-56.

18 Eriksson A., 2008, Optimization in target movement simulations, *Comput. Methods Appl. Mech. Engrg.*, **197**, 4207-4215.

19 Essén H., 2008, Magnetic energy per particle in constant current density, *Europhys. Lett.*, **84**, 20011-1-5.

20 Farzadi A., Do-Quang M., Serajzadeh S., Kokabi A.H., Amberg G., 2008, Phase-field simulation of weld solidification microstructure in an Al-Cu alloy, *Modelling and Simulation in Materials Science and Engineering*, **16**, 065005.

21 Grundestam O.G., Wallin S., Johansson A.V., 2008, Direct numerical simulations of rotating turbulent channel flow, *J. Fluid Mech.*, **598**, 177–199.

22 Grundestam O.G., Wallin S., Johansson A.V., 2008, A priori evaluations and least-squares optimizations of turbulence models for fully developed rotating turbulent channel flow, *Eur J. Mech. B/Fluids*, **27**, 75-95.

23 Henningson D.S, Åkervik E.Å., 2008, The use of global modes to understand transition and perform flow control, *Phys. Fluids*, **20**, 031302.

24 Hoepffner J.P.J., Brandt L., 2008, Stochastic approach to the receptivity problem applied to bypass transition in boundary layers, *Phys. Fluids*, **20, 024108**, 1-4.

25 Holmqvist J.F., Dahlkild A., 2008, Consolidation of sheared, strongly flocculated suspensions, *AIChE J.*, **54**, 924-939.

26 Hyensjö M., Dahlkild A., 2008, Study of the Rotational Diffusivity Coefficient of Fibres in Planar Contracting Flows with Varying Turbulence levels, *Int. J. Multi-Phase Flow*, **34**, 894-903.

27 Ipek N., Vynnycky M., Cornell A., 2008, A coupled electrochemical and hydrodynamical two-phase model for the electrolytic pickling of steel, *J. Electrochem. Soc.*, **155**, P33–P43.

28 Jacob B., Casciola C.M., Talamelli A., Alfredsson P.H., 2008, Scaling of mixed structure function in turbulent boundary layers., *Phys. Fluids*, **20**, 045101.

29 Kaphle M., Eriksson A., 2008, Optimality in forward dynamics simulations, *J. Biomechanics*, **41**, 1213-1221.

30 Kosterina N., Westerblad H., Länngergren J., Eriksson A., 2008, Muscular force production after concentric contraction, *J. Biomechanics*, **41**, 2422-2429.

31 Lindborg E., Brethouwer G., 2008, Vertical dispersion by stratified turbulence, *J. Fluid Mech.*, **614**, 303–314.

32 Lingwood R.J., Boyle P., Milburn A., Ngoma T., Arbuthnott J., McCaffrey R., Kerr S.H., Kerr D.J., 2008, The challenge of cancer control in Africa, *Nature Reviews Cancer*, **8**, 398-403.

33 Ljubimova D., Eriksson A., Bauer S., 2008, Aspects of eye accommodation evaluated by finite elements, *Biomech. Modeling Mechanobiol.*, **7**, 139–150.

34 Lögdberg O., Angele K., Alfredsson, P.H., 2008, On the scaling of turbulent separating boundary layers, *Phys. Fluids*, **20**, 075104.

35 Maciel Y., Facciolo L, Duwig C., Fuchs L., Alfredsson P.H., 2008, Near field dynamics of a turbulent round jet with moderate swirl, *Int. J. Heat and Fluid Flow*, **29**, 675-686.

36 Medici D., Alfredsson P.H., 2008, Measurements behind model wind turbines: further evidence of wake meandering, *Wind Energy*, **11**, 211-217.

37 Mellgren N., Brown S., Vynnycky M., Lindbergh G., 2008, Impedance as a tool for investigating aging in lithium-ion porous electrodes: I. Physically based electrochemical model, *J. Electrochem. Soc.*, **155**, A304–A319.

38 Monokrousos A M, Brandt L., Schlatter P., Henningson D.S, 2008, DNS and LES of estimation and control of transition in boundary layers subject to free-stream turbulence, *Int. J. Heat and Fluid Flow*, **29**, 841-855.

39 Nielsen C, Gutierrez-Farewik E.M., Hirschfeld H, Saraste H., 2008, Seat load characteristics in children with neuromuscular and syndrome related scoliosis, *J. Pediatric Orthopedics B*, **17**, 139-44.

40 Riley J.J., Lindborg E., 2008, Stratified turbulence: a possible interpretation of some geophysical turbulence measurements, *J. Atmos. Sci.*, **65**, 2416-2424.

41 Russell C., Tibert G., 2008, Deployment Simulations of Inflatable Tensegrity Structures, *Int J Space Struct*, **23**, 63-77.

42 Schlatter P., Brandt L., De Lange H.C., Henningson D.S, 2008, On streak breakdown in bypass transition, *Phys. Fluids*, **20**, 101505.

43 Söderholm L.H., 2008, Hilbert fluid dynamics equations expressed in Chapman-Enskog pressure tensor and heat current, *Transport Theory and Statistical Phys.*, **37**, 520-534.

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46 Thylwe, K.-E., 2008, Amplitude-phase formula for the S-matrix derived from invariants of the reduced first-order radial Dirac equation, *Physica Scripta*, **78**, 065006.

47 Villanueva W, Grönhagen K, Amberg G., Ågren J., 2008, Multicomponent and multiphase modeling and simulation of reactive wetting, *Phys. Rev. E.*, **77**, 056313.

48 Yang L, Duan F, Eriksson A, 2008, Analysis of the optimal design strategy of a magnetorheological smart structure, *Smart Materials and Structures*, **17**, 15047.

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50 Örlü R., Alfredsson P.H., 2008, An Experimental Study of the Near-Field Mixing Characteristics of a Swirling Jet, *Flow, Turbulence and Combustion*, **80**, 323-350.

51 Örlü R., Alfredsson P.H., 2008, Passive scalar flux measurements in the near-field of a swirling jet, *Heat Transfer Research*, **39**, 597-607.

### 5.3.2 Other publications

52 Bagheri S., Åkervik E.Å., Brandt L., Henningson D.S, 2008, Input–output analysis and control of spatially developing shear flows, *AIAA Paper 2008–4099.*

53 Bellani G., Lundell F., Söderberg D., 2008, Experimental study on the forming process: fluid velocity and fluid-fiber interaction measurements, *PaperCon 2008 — TAPPI/PIMA Joint Conf., Dallas, TX.*

54 Benavides A., Strömgren T., van Wachem B., Brethouwer G., Amberg G., Johansson A.V., 2008, Numerical computation of turbulent gas-particle flow in a backward-facing step. Model comparison with experimental data., *Proc. of the 11th Int. Conf. on Multiphase Flow in Industrial Plants*, 63–70.

55 Carlborg C.F., Do-Quang M., Stemme G., Amberg G., van der Wijngaart W., 2008, Continuous flow switching by pneumatic actuation of the air lubrication layer on superhydrophobic microchannel walls., *Micro Electro Mechanical Systems, 2008. MEMS 2008. IEEE 21st Int. Conf.*, **13–17**, 599.

56 Carlson A.C., Do-Quang M., Amberg G., 2008, Droplet dynamics in a microfluidic bifurcation, *Proc. of the 1st European Conf. on Microfluidics — Microfluidics*, FLU08–130.

57 Carlson A.C., Kudinov P.K., Narayanan CN, 2008, Prediction of two-phase flow in small tubes: A systematic comparison of state-of-the-art CMFD codes, *5th European Thermal-Sciences Conf.*.

58 Carlsson A., Lundell F., Söderberg D., 2008, Fibre orientation in the boundary layers of a planar converging channel, *PaperCon 2008 — TAPPI/PIMA Joint Conf., Dallas, TX.*

59 Do-Quang M., Amberg G., Stemme G., van der Wijngaart W., 2008, Numerical simulation of the passage of small liquid droplets through a thin liquid film, *6th Int. Conf. on Nanochannels, Microchannels, and Minichannels*, ICNMM2008–62319.

60 Do-Quang M., Carlson A.C., Amberg G., 2008, Capillary force dominated impact of particle to free liquid surface, *Proc. of the 1st European Conf. on Microfluidics — Microfluidics*, FLU08–128.

61 Do-Quang M., Amberg G., 2008, Modelling the influence of wetting properties on the solid liquid impact, *6th Int. Conf. on Nanochannels, Microchannels, and Minichannels*, ICNMM2008–62216.

62 Do-Quang M., Amberg G., 2008, Modelling the growth and motion of a free dendrite under terrestrial conditions, *Proc. of the XXII Int. Congress of Theoretical and Applied Mechanics (ICTAM).*

63 Do-Quang M., Amberg G., 2008, Coupled problems on the solid liquid impact — the influence of wetting, *Proc. of the European Seminar on Coupled Problems, Jetrichovice, Czech Republic. June 8–13, 2008.*

64 Enflo B.O., Hedberg C.M., Kari L., 2008, Nonlinear Acoustics Fundamentals and Applications. Proc. of the 18th Int. Symposium on Nonlinear Acoustics (18th ISNA), Stockholm, Sweden, 7–10 July 2008, *AIP Conf. Proceedings*, **1022**.

65 Enflo B., Hedberg C.M., 2008, A Standing Acoustic Wave with Shocks in a Cubically Nonlinear Medium, *AIP Conf. Proceedings*, **1022**, 263–266.

66 Fallenius B., Fransson J. H. M., 2008, Vortex analysis in the near wake behind a porous cylinder subject to blowing or suction, *7th Eur. Fluid Mech. Conf. EFMC7, Manchester, 14–18 Sept. 2008.*, 96.

67 Fransson J. H. M., 2008, Experimental study of turbulent spot evolution in the ASBL, *7th Eur. Fluid Mech. Conf. EFMC7, Manchester, 14–18 Sept. 2008.*, 104.

68 Fransson J. H. M., 2008, Turbulent spot evolution in the ASBL, *61rd Meeting of the APS Division of Fluid Dynamics, Nov. 23–25, San Antonio, TX, USA. Abstract in Bull. Am. Phys. Soc.*, 62.

69 Fransson J. H. M., Fallenius B., 2008, Wake flow manipulation by means of blowing and suction, *Proc. XXII ICTAM, 25–29 August 2008, Adelaide, Australia*, 128.

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71 Kurian T., Fransson J. H. M., 2008, Effect of surface roughness and FST on crossflow instability, *7th Eur. Fluid Mech. Conf. EFMC7, Manchester, 14–18 Sept. 2008.*, 181.

72 Laurantzon F.L., Tillmark N., Alfredsson P.H., 2008, The corona mass flow meter., *19th Symposium on Measuring Techniques in Transonic and Supersonic Flow in Cascades and Turbomachines, von Karman Institute Rhode-St-Genese, Belgium, April 7–8, 2008.*

73 Lundell F., 2008, Estimation of the potential of a flow-control experiment by system identification, *Proc. XXII ICTAM, 25–29 August 2008, Adelaide, Australia.*

74 Lundell F., Bellani G., Söderberg D., 2008, Flow velocity measurements in a fiber suspension flow: the formation of a fiber network, *21st Nordic Seminar on Computational Mechanics, Trondheim, Norway, 16–17 October.*

75 Marstorp L.M., Brethouwer G., Johansson A.V., 2008, Explicit algebraic subgrid models for large-eddy simulation, *Direct and Large-Eddy Simulation VII*.

76 Ruedi J. D., Talamelli A., Nagib H.M., Alfredsson P.H., Monkewitz P. A., 2008, CICLoPE — A new high Reynolds number pipe flow facility for detailed turbulence measurements., *Proc. XXII ICTAM, 25–29 August 2008, Adelaide, Australia.*

77 Strömgren T., Brethouwer G., Amberg G., Johansson A.V., 2008, Model simulations of two-way coupling effects on evolving particle-laden turbulent channel flow, *Proc. of the 7th Int. Symposium on Engineering Turbulence Modeling and Measurements*, 480–485.

78 Talamelli A., Ruedi J. D., Alfredsson P.H., Nagib H.M., Monkewitz P. A., 2008, The new high Reynolds number pipe flow facility at CICLoPE., *38th Fluid Dynamics Conf. and Exhibit, 23–26 June 2008, Seattle, Washington*, AIAA 2008–3966.

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80 Tibert G., 2008, Computational Challenges for Highly Flexible Space Structures, *21st Nordic Seminar on Computational Mechanics, Trondheim, Norway, 16–17 October*, 43–46.

81 Tibert G., 2008, Bending-Stiff Tensegrity Masts: Do They Exist?, *Proc. 6th Int. Conf. on Computation of Shell & Spatial Structures, 28–31 May, Ithaca, NY, USA*, paper F–3–E–3.

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### 5.3.3 Technical reports (TRITA)

86 Bagheri S., 2008, Stability analysis and control design of spatially developing flows, *Licentiate thesis*, KTH/MEK/TR–08/04–SE.

87 Bellani G., 2008, Velocity measurements in a fiber suspension flow: formation of a fiber network, *Licentiate thesis*, KTH/MEK/TR–08/07–SE.

88 Gärdsback M., 2008, Deployment Control of Spinning Space Webs and Membranes, *Doctoral thesis*, KTH/MEK/TR–08/10–SE.

89 Hellström F., 2008, Numerical computations of the unsteady flow in a radial turbine, *Licentiate thesis*, KTH/MEK/TR–08/02–SE.

90 Hyensjö M., 2008, Fibre Orientation Modelling Applied to Contracting flows Related to Papermaking, *Doctoral thesis*, KTH/MEK/TR–08/03–SE.

91 Ivanell S. et al., 2008, Validation of methods using EllipSys3D, KTH/MEK/TR–08/12–SE.

92 Lin Y., 2008, Modeling of dielectrophoresis in micro and nano systems, *Doctoral thesis*, KTH/MEK/TR–08/05–SE.

93 Lögdberg O., 2008, Turbulent boundary layer separation and control, *Doctoral thesis*, KTH/MEK/TR–08/11–SE.

94 Marstorp L., 2008, Modelling of subgrid-scale stress and passive scalar flux in large eddy simulations of wall bounded turbulent flows, *Doctoral thesis*, KTH/MEK/TR–08/06–SE.

95 Schrader L.-U., 2008, Receptivity of Boundary Layers under Pressure Gradient, *Licentiate thesis*, KTH/MEK/TR–08/08–SE.

96 Schwenck N., 2008, OpenSim. Evaluating an Open Source Simulation Software for Human Movements, KTH/MEK/TR–08/13–SE.

97 Strömgren , 2008, Modelling of turbulent gas-particle flows with focus on two-way coupling effects on turbophoresis, *Licentiate thesis*, KTH/MEK/TR–08/01–SE.

98 Åkervik E.Å., 2008, Global stability and feedback control of boundary layer flows, *Doctoral thesis*, KTH/MEK/TR–08/09–SE.

## 5.4 Seminars at the department

*January 22* Bernhard Mehlig, Physics, Chalmers
Clustering, caustics & collisions in turbulent aerosols.

*January 24* GertJan van Heijst, Eindhoven University of Technology
Two-dimensional turbulence on a bounded domain, the role of angular momentum.

*February 1* Claes Hedberg, Blekinge Tekniska Högskola
Self-silenced sound and nonlinear acoustic non-destructive testing.

*February 8* Ephraim Gutmark, U. Cincinnati
On synthetic jets and their application.

*February 14* Wouter van der Wijngaart, Microsystem Technology Lab.
Surface tension based microfluidic components.

*February 18* Edmond Walsh, University of Limerick, Ireland
Peak streak perturbations and entropy generation rates in boundary layers subjected to free stream turbulence.

*February 21* Donald Mc Eligot, Idaho National Laboratory, University of Stuttgart
Recent studies with the World's largest Matched-Index-of-Refraction flow system.

*February 22* Luca Brandt, KTH Mechanics
Boundary layer receptivity.

*February 28* Minh Do-Quang, KTH Mechanics
Simulation of influence of wetting parameters on the solid-liquid impact.

*March 6* Lars-Uve Schrader, KTH Mechanics
Receptivity mechanisms in three-dimensional boundary layers.

*March 7* Fredrik Lundell, KTH Mechanics
Suspensions of non-spherical particles: an introduction to differences between water, clay and pulp.

*March 12* Tobias Strömgren, KTH Mechanics
Modelling of turbulent gas-particle flow.

*March 13* A Hirschberg, Technical University of Twente, The Netherlands
Human whistling, gas-transport systems, Ariane V and corrugated pipes.

*March 20* Anders Dahlkild, KTH Mechanics
Evolution of flat plate wakes in sink flow.

*March 28* Fredrik Hellström, KTH Mechanics
Numerical computations of the unsteady flow in a radial turbine.

*April 10* Masaharu Matsubara, Shinshu University, Japan
High Reynolds experiments using towing tank facilities.

*April 15* Tomas Oppelstrup, KTH NADA
Efficient simulation of Brownian motion in the low density limit.

*April 15* Hassan Nagib, KTH Mechanics
Recent developments in turbulent boundary layers understanding.

*April 17* Etienne Roberg, EPFL Lausanne
Experimental investigation of unstrained diffusion flames and their instabilities.

*April 21* Carlo Cossu, LadHyX - Ecole Polytechnique, France
Optimal perturbations and very large scale structures in turbulent boundary layers.

*April 24* Elisabetta De Angelis, University of Bologna
Drag reduction in wall turbulence.

*April 29* Arne Nordmark, KTH Mechanics
Mechanical rigid body systems with impacts and friction: How the simplest models lead to strange behavior like Painlevé paradoxes and reverse chattering.

*May 7* Carlo Casciola, University of Rome
Turbulence basics: Small scale turbulence basics.

*May 8* Carlo Casciola, University of Rome
Turbulence basics: Intermittency.

*May 8* Carlo Casciola, University of Rome
Turbulence basics: Small scale anisotropy.

*May 9* Carlo Casciola, University of Rome
Turbulence basics: Small scale anisotropy, numerical and experimental results.

*May 19* Beverley McKeon, California Institute of Technology
The atmospheric surface layer as a model for canonical turbulent boundary layers.

*May 20* Alexander Smits, Princeton University
Smooth and rough wall pipe flows.

*May 22* Gilead Tadmor, Mathematics Department, Northeastern University
A Unified Framework for Low Order Galerkin Flow Models and Feedback Flow Control.

*May 26* Hassan Nagib, KTH Mechanics
Comparison of Mean Flow Similarity Laws in Wall-Bounded Flows.

*May 27* Bengt Enflo, KTH Mechanics
A standing acoustic wave with shocks in a cubically nonlinear medium.

*May 27* Ivan Marusic, University of Melbourne
Modeling Wall Turbulence Using the Attached Eddy Hypothesis.

*June 3* Karl-Erik Thylwe, KTH Mechanics
(Sub)atomic Wave Mechanics - New amplitude-phase method approach to solving the radial Dirac equation.

*June 5* Marko Hyensjö, KTH Mechanics
Fibre orientation modelling applied to contracting flows related to Papermaking.

*June 5* Shervin Bagheri, KTH Mechanics
Stability analysis and control design of spatially developing flows.

*June 11* Yuan Lin, KTH Mechanics
Modeling of dielectrophoresis in micro and nanosystems.

*June 12* Yohann Duguet, KTH Mechanics
Transition to turbulence in pipe flow: dynamical role of finite-amplitude solution.

*June 13* Linus Marstorp, KTH Mechanics
Modelling of subgrid-scale stress and passive scalar flux in large eddy simulations of wall bounded flows.

*August 25* Ephraim Gutmark, U. Cincinnati
Subsonic and supersonic flow control for Jet Noise Suppression.

*August 28* Fulvio Martinelli, Politecnico di Milano
Application of Wiener filtering theory to state estimation in wall bounded flows.

*September 2* Riccardo Rossi, University of Bologna
Numerical simulation of scalar dispersion in complex flows.

*September 18* Gaetano Sardina, University of Rome, La Sapienza
Spatially evolving turbophoresis: mechanics of inertial particle accumulation at the wall.

*September 25* Murtazo Nazarov, KTH NADA
A General Galerkin Finite Element Method for the Compressible Euler Equations.

*October 10* Parviz Moin, CTR, Stanford University
Integrated Simulation of Complex Multi-Physics Turbulent Flows.

*October 21* Axel Kierkegaard, Aero
Numerical investigations of generation and propagation of sound waves in low Mach number internal flows.

*October 22* Wolfgang Polifke, TU Munich
Identification of thermo- and aero-acoustic response functions from CFD time series.

*October 29* Gabriele Bellani, KTH Mechanics
Velocity measurements in a fiber suspension flow: formation of a fiber network.

*October 30* Johan Hoffman, KTH NADA
On the Euler equations as a model for high Reynolds number flow.

*November 6* Gastan Compere, Université catholique de Louvain
Transient mesh adaptivity applied to fluid-structure interaction problems with large displacements.

*November 14* Lars-Uve Schrader, KTH Mechanics
Receptivity of Boundary Layers under Pressure Gradient.

*November 27* S.J. Garrett, University of Leicester
A theoretical study of the transition of boundary layers on rotating bodies.

*December 4* Allan Carlsson, KTH Mechanics
Near wall fibre orientation in flowing suspensions.

*December 5* Espen Åkervik, Linné Flow Centre, KTH Mechanics
Global stability and feedback control of boundary layer flows.

*December 8* Mattias Gärdsback, KTH Mechanics
Deployment Control of Spinning Space Webs.