

## CURRICULUM VITAE

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### **Personal data**

Name: Jan-Olov Aidanpää  
Born: 17<sup>th</sup> of April 1962 in Gällivare, Sweden  
Sex: Male  
Address: Ängesbyvägen 125, S-975 98 Luleå, Sweden,  
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Family: Spouse Åsa and three children ; Oliver, Benjamin and Adrian  
Citizenship: Swedish

### **Academic degrees and evaluation**

1987. M. Sc. in Mechanical Engineering from Luleå University of Technology, Luleå, Sweden.  
1992. Licentiate in Solid Mechanics from Luleå University of Technology, Luleå, Sweden (worked one year 92-93 with research at Clarkson University, Potsdam, NY, USA)  
1995. PhD in Solid Mechanics from Luleå University of Technology, Luleå, Sweden.  
1998 Senior Lecturer in Solid Mechanics at Luleå University of Technology, Luleå, Sweden.  
2001 Senior Lecturer in Computer Aided Design at Luleå University of Technology, Luleå, Sweden.  
2005 Associate Professor  
2007 Associate Professor in Solid Mechanics at Luleå University of Technology, Luleå, Sweden.

### **Industrial experience**

(1987-1989) ABB STAL AB, Finspång Sweden and ABB BADEN, Switzerland. I started as trainee and then become an solid mechanics engineer at the service department for industrial steam turbines and heat pumps. The last year I worked as group leader for five computational engineers at the same department.

(1994-1998) Research engineer at Swedish institute of composites (SICOMP). Worked with; industrial consulting on design of composites, advanced solid mechanics on the support structures of the ATLAS detector in CERN, coordinator of an European CRAFT project and as scientific leader.

### **Education**

During 1998-2005 I have been lecturer and in many cases examiner (\*) for the following courses at LTU

- Introduction to solid mechanics (grundkurs i hållfasthetslära).
- Applied solid mechanics (tillämpad hållfasthetslära)\*

- Continuum mechanics (kontinuum mekanik)
- Applied mechanics (mekanikens tillämpningar)\*
- Mechanical vibrations (grundkurs i maskindynamik)\*
- Structural dynamics (fortsättningskurs i maskindynamik)\*
- Vehicle dynamics (fordonsdynamik)

And the graduate courses

- Rotor Dynamics (rotordynamik)\*
- Non-linear Dynamics (ickelinjär dynamik)\*

## Research

During my graduate studies the research area was chaos and non-linear dynamics. Since 2000 the research is focused on rotor dynamics and today I supervise four graduate students and have examined three PhD's and five technical licentiates. The research areas are; non-linear dynamics, multiobjective optimization of rotor-bearing systems, concept evaluation of rotor systems, rotor dynamical models of hydropower rotors and multi-physics (electro, fluid and bearing interaction) in hydropower rotors. We work closely together with the machine element and fluid mechanic division in the multi-physical research. Together we can solve a broad span of rotor dynamical problems. We have been working for several years together with Uppsala University (Division of Electricity and Lightning Research), to find electromagnetic forces in hydropower generators. Lately we have initiated cooperation with the fluid mechanic group at Chalmers to study the forces and additional inertia from the rotor fluid interaction. With this competence we will be able to cover several aspects of multi-physics in rotating machines.

## Opponent for

Jenny Jerrelind Licentiate thesis; "Effect of Nonlinear Dynamics in Engineering Systems", Department of Aeronautical and Vehicle Engineering, Division of Vehicle Dynamics, KTK, Stockholm, 2001-03-02.

Thomas Englund Licentiate thesis; "Dynamic Characteristics of Automobile Exhaust System Components" Dept. of Mechanical Engineering, Blekinge Institution of Technology, BTH, Karlskrona. 2003

Jenny Jerrelinds PhD thesis; "Design and Control of Products Including Parts with Impacts", Department of Aeronautical and Vehicle Engineering, Division of Vehicle Dynamics KTK, Stockholm, 2004-03-02.

Johan Eriksson, Licentiate thesis; "Experimental and Numerical Studies of Nonsmooth Mechanical Systems", Department of Mechanics, KTH, Stockholm, 2005-04-29.

Kourosh Tatar, Licentiate thesis; "Machine tool vibration and violin sound field study using laser vibrometry", Div of Experimental Mechanics, LTU, Sweden, 2006-05-31.

Sandra Erikssons, Licentiate thesis; "Vertical Axis Wind Turbines with Direct Driven Generators", Uppsala University, Div of Electricity and Lightning Research, UU, Sweden 2006-10-20.

### **In examination bord for**

Björn Bolund PhD thesis, “ Electric Power Generation and Storage Using High Voltage Approach, Div of Electricity and Lightning Research, UU, Sweden 2006-05-19.

### **Supervised Licentiate Theses**

Karlberg M., Concept Evaluation and Contact Problems in Simple Rotordynamical Systems, Licentiate thesis, Luleå University of Technology, ISSN:1402-1757;2003:45

Angantyr A., Constrained Optimization of Rotor-Bearing Systems by Evolutionary Algorithms, Licentiate thesis, Luleå University of Technology, ISSN:1402-1757;2004:4

*Gustavsson R. K.*, Modelling and Analysis of Hydropower Generator Rotors, Licentiate thesis, Luleå University of Technology, ISSN:1402-1757;2005:62

*Karlsson M.*, Electro-mechanical Modelling and Analysis of Hydroelectric Rotor Systems, Licentiate thesis, Luleå University of Technology, ISSN:1402-1757;2006:10

*Lundström N.*, Dynamic Consequences of Shape Deviations in Hydropower Generators, Licentiate thesis, Luleå University of Technology, ISSN:1402-1757;2006:39

### **Supervised PhD Dissertations**

*Karlberg M.*, Rotordynamical Concept Evaluation of Fibre Refiners, Doctoral thesis, Luleå University of Technology, ISSN:1402-1544;2005:37

Angantyr A., Rotordynamic Optimization of Large Turbo Systems using Genetic Algorithms, Doctoral thesis, Luleå University of Technology, ISSN:1402-1544;2006:12

Karlsson M., Modelling and Analysis of Multiphysical Interactions in Hydropower Rotor Systems, Doctoral thesis, Luleå University of Technology, ISSN:1402-1544;2008:27

Gustavsson R., Rotor Dynamical Modelling and Analysis of Hydropower Units, Doctoral thesis, Luleå University of Technology, ISSN:1402-1544;2008:50

### **Publications**

1. J-O Aidanpää, Two vibroimpacting systems with amplitude constraints. *Licentiate thesis, Luleå Technical University*, ISSN:0280-8242, 1992:11L.
2. J-O Aidanpää and R. B. Gupta, Periodic and chaotic behaviour of a threshold-limited two-degree-of-freedom system. *Journal of Sound and Vibration*, Volume 162, Number 2, pp 305-327, (1993).

3. J-O Aidanpää, H. H. Shen, R. B. Gupta and M. Babic , One-dimensional model for the transition from periodic to chaotic motions in granular shear flows. *Mechanics of Materials*, Volume 16, pp 153-161, (1993).
4. J-O Aidanpää, H. H. Shen and R. B. Gupta, Stability and bifurcations of a stationary state for an impact oscillator. *CHAOS*, Volume 4, Number 4, pp 621-630, (1994).
5. J-O Aidanpää, Dynamics of some vibro-impacting systems with amplitude constraints, *Doctoral thesis, Luleå Technical University*, ISSN: 0348-8379; 163D, 1995.
6. J-O Aidanpää, H. H. Shen and R. B. Gupta, Experimental and numerical studies of shear layers in a granular shear cell. *Journal of Engineering Mechanics*, Volume 122, Number 3, pp 187- 196, (1996).
7. H. H. Shen and J-O Aidanpää, Onset of transition for cohesive and viscous granular flows. *Journal of Engineering Mechanics*, Volume 124, Number 10, pp 1073- 1079, (1998).
8. M. Karlberg and J-O Aidanpää, Evaluation of rotordynamical concepts subjected to rotating unbalance and impulse, *IFTOMM, Sixt International Conference on Rotor Dynamics*, Sidney, Australia Sept 30-Oct. 4, (2002).
9. M Karlberg and J-O Aidanpää, Numerical investigation of an unbalanced rotor system with bearing clearance, *Chaos, Solitons & Fractals*, Volume 18, pp 653-664, (2003).
10. A Angantyr and J-O Aidanpää, A Pareto Based Genetic Algorithm Search Approach to Handle Damped Natural Frequency Constraints in Turbo Generator Rotor System Design”, *Accepted for publication in ASME Journal of Engineering for Gas Turbines and Power*. (2003).
11. R K Gustavsson and J-O Aidanpää, Measurement of Bearing Load Using Strain Gauges at Hydropower Unit”, *Hydro Review*, Volume 11, Number 5, pp30-36, (2003).
12. A Angantyr, J Andersson and J-O Aidanpää, Constrained Optimization based on a Multiobjective Evolutionary Algorithm”, In Sarker R. et al. (Eds.), *Proceedings of the Congress on Evolutionary Computation*, Canberra, Australia, Dec 8-12, 2003, IEEE-Press, **3**, pp. 1560-1567.
13. M Karlberg and J-O Aidanpää, Investigation of an unbalanced rotor system with bearing clearance and stabilising rods, *Chaos, Solitons & Fractals*, Volume 20, pp363-374, (2003).
14. J-O Aidanpää , Multiple solutions in a rub-impact Jeffcott rotor, *The 10th International Symposium on Transport Phenomena and Dynamics of Rotating Machinery*, Honolulu, Hawaii, March 07-11, 2004
15. M Karlberg and J-O Aidanpää, Nonlinear Dynamics due to Loss of Contact in Preloaded Spherical Roller Thrust Bearings, *The 10th International Symposium on Transport*

*Phenomena and Dynamics of Rotating Machinery, Honolulu, Hawaii, March 07-11, 2004*

16. A Angantyr and J-O Aidanpää, Optimization of a Rotor-Bearing System with an Evolutionary Algorithm, *The 10th International Symposium on Transport Phenomena and Dynamics of Rotating Machinery, Honolulu, Hawaii, March 07-11, 2004*
17. R K Gustavsson and J-O Aidanpää, The influence of magnetic pull on the stability of generator rotors, *The 10th International Symposium on Transport Phenomena and Dynamics of Rotating Machinery, Honolulu, Hawaii, March 07-11, 2004*
18. A Angantyr and J-O Aidanpää, Constrained Optimization of Gas Turbine Tilting Pad Bearing Designs, *ASME Journal of Engineering for Gas Turbines and Power*, Vol 128, n 4., pp873-878. (2006)
19. R K Gustavsson, M L Lundström and J-O Aidanpää, Determination of Journal Bearing Stiffness and Damping at Hydropower Generators Using Strain Gauges, *PWE2005, ASME Power, Chicago, Illinois, April 5-7, 2005*
20. M Karlsson and J-O Aidanpää, Dynamic Behaviour in a Hydro Power Rotor System due to the Influence of Generator Shape and Fluid Dynamics, *PWE2005, ASME Power, Chicago, Illinois, April 5-7, 2005*
21. R K Gustavsson and J-O Aidanpää, The Influence of Non-Linear Magnetic Pull on Hydropower Generator Rotors, *Journal of Sound and Vibration*, Volume 297, 3-5, pp551-562,(2006)
22. J-O Aidanpää, Multiple Solutions in an Amplitude Limited Jeffcott Rotor Including Rubbing and Stick-Slip Effect., *ASME 2005 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference*, September 24-28, 2005, Long Beach, California, USA
23. M J Cervantes, J-O Aidanpää, S Glavatskih and, T Karlsson, Group Dynamics, *International Water Power and Dam Construction*, Volume 57, Number 12, Dec 2005.
24. L. Lundström, R. Gustavsson, J-O Aidanpää, N. Dahlbäck, and M. Leijon, Influence on the Stability of Generator Rotors due to Radial and Tangential Magnetic Pull Force, *IET Electric Power Applications*, v 1, no 1, Jan. 2007, p 1-8
25. J-O Aidanpää, Rotor dynamics analysis of failure due to rotor-stator contact in an overhung rotor, *7th IFToMM-Conference on Rotor Dynamics*, Vienna, Austria, 25-28 September 2006
26. M Karlsson and J-O Aidanpää, Characteristics of a Hydro Power Rotor System due to a Sudden loss of Magnetic Field, *7th IFToMM-Conference on Rotor Dynamics*, Vienna, Austria, 25-28 September 2006

- 27 M Karlsson, R. Perers, R. Gustafsson, J-O Aidanpää, T. Karlsson and M. Leijon Rotor Dynamical Analysis of a Hydroelectric Generator for Active Loads, *Proceedings of International Symposium on Water Resources and Renewable Energy Development in Asia, November 30 - December 01 2006., Bangkok.*
- 28 M Karlberg and J-O Aidanpää , Rotordynamical modelling of a fibre refiner during production, *Journal of Sound and Vibration, Volume 303, 3-5,pp440-454, 2006.*
- 29 M. Rantatalo, J-O Aidanpää, B. Göransson and P. Norman, “Milling machine spindle analysis using FEM and non contact spindle excitation and response measurement” *Accepted for publication in International Journal of Machine Tools and Manufacturing, June 2006. International Journal of Machine Tools and Manufacture, v 47, n 7-8, June, 2007, p 1034-1045*
- 30 N. Lundström and J-O Aidanpää, Dynamic consequences of electromagnetic pull due to deviations in generator shape, *Journal of Sound and Vibration, Volume 301, 1-2, pp207-225, 2007.*
- 31 M Karlsson, R. Perers, J-O Aidanpää and M. Leijon Rotor Dynamic Analysis of an Eccentric Hydropower Generator with Damper Winding for Reactive Load, *Journal of Applied Mechanics. Volume 74,pp 1178-1186, 2007.*
- 32 M Karlsson, H Nilsson and J-O Aidanpää. Influence of inlet boundary conditions in the prediction of rotor dynamic forces and moments for a hydraulic turbine using CFD. To be presented at *The 12th International Symposium on Transport Phenomena and Dynamics of Rotating Machinery, Honolulu, Hawaii, February, 2008.*
- 33 M Nässelqvist, R Gustavsson and J-O Aidanpää. Case study of resonance phenomena in a vertical hydropower unit. To be presented at *The 12th International Symposium on Transport Phenomena and Dynamics of Rotating Machinery, Honolulu, Hawaii, February, 2008.*
- 34 N. Lundström and J-O Aidanpää, Whirling Frequencies and Amplitudes due to Deviations in Generator Shape, *Accepted to be published in International Journal of Non-Linear Mechanics, August 2008.*
- 35 I. Jansson, M.J. Cervantes, J.O. Aidanpää, A Monitoring System to Estimate the Pressure Field of a Kaplan Runner Blade Prototype. IAHR, 24th Symposium on Hydraulic Machinery and Systems, Foz do Iguasso, Brazil, October 27-31, 2008.
- 36 J-O. Aidanpää, R. K. Gustavsson, N. L. P. Lundström, M. Karlsson, Y. Calleecharan, M. L. Nässelqvist, M. Karlberg, U. Lundin, Developments in Rotor Dynamical Modeling of Hydropower units, *IUTAM Symposium on Emerging Trends in Rotor Dynamics, IUROTOR-2009, Indian Institute of Technology Delhi, India, March 23-26, 2009*
- 37 M. Karlsson, H. Nilsson and J-O Aidanpää, Numerical Estimation of Torsional Dynamic Coefficients of a Hydraulic Turbine, *International Journal of Rotating Machinery, Vol 2009, 2009.*
- 38 Niklas L.P. Lundström and Jan-Olov Aidanpää, Whirling frequencies and amplitudes due to deviations of generator shape, ”*International Journal of Non-Linear Mechanics*”, Volume 43, Issue 9, November 2008, Pages 933-940

- 39 Rolf. K. Gustavsson, Jan-Olov Aidanpää, "Evaluation of impact dynamics and contact forces in a hydropower rotor due to variations in damping and lateral fluid forces", International Journal of Mechanical Sciences, Volume 51, Issues 9-10, September-October 2009, Pages 653-661
- 40 Martin Karlsson, Håkan Nilsson, and Jan-Olov Aidanpää, Numerical Estimation of Torsional Dynamic Coefficients of a Hydraulic Turbine, International Journal of Rotating Machinery, Volume 2009 (2009), Article ID 349397, 7 pages doi:10.1155/2009/349397
- 41 J-O. Aidanpää "Analysis of multiple solutions in bifurcation diagrams to avoid unexpected dynamics" CHAOS 2009, The 2nd Chaotic Modeling and Simulation International Conference, MAICH Conference Centre, Chania, 1 - 5 June 2009
- 42 Niklas L.P. Lundström and Jan-Olov Aidanpää, Complex Dynamic Responses due to Deviations of Generator Shape, 10<sup>th</sup> Conference on Dynamical Systems - Theory and Applications DSTA-2009, December 7-10, Łódź, Poland
- 43 Marcus Sandberg, Michael Kokkolaras, Jan-Olov Aidanpää, Ola Isaksson, Tobias Larsson, "A master modelling approach to whole jet engine analysis and design optimization", 8<sup>th</sup> World Congress on Structural and Multidisciplinary Optimization, June 1 - 5, 2009, Lisbon, Portugal
- 44 M.J. Cervantes, I. Jansson, A. Jourak, S. Glavatskih, J.O. Aidanpää, Porjus U9A full-scale hydropower research facility. IAHR, 24th Symposium on Hydraulic Machinery and Systems, Foz do Iguasso, Brazil, October 27-31, 2008.

#### Submitted papers

M. Nässelqvist, R. Gustavsson, J-O. Aidanpää, "Bearing load measurement in a hydropower unit using cylindrical strain gauges installed inside pivot pins," Submitted to Journal of Engineering Mechanics in November, 2009, p. 8.

M. Sandberg, M. Kokkolaras, Ola Isaksson, J-O Aidanpää, T. Larsson, "A knowledge-based master-model approach to whole jet engine design", Submitted to Computers in industry

#### **Reviewer for**

Journal of sound and vibration  
 ASME  
 Journal of Vibration and Control  
 International Journal of Nonlinear Mechanics  
 Journal of Mechanical Engineering Science, Part C.  
 Nonlinear Dynamics

#### **Reviewed book for**

Journal of Mechanical Engineering Science Part C.  
 Book: Mechanical Vibrations by Singiresu S. Rao, forth edition, 2006.

### **Chairman/co-chairman at**

The 10th International Symposium on Transport Phenomena and Dynamics of Rotating Machinery, Honolulu, Hawaii, March 07-11, 2004.

ASME 2005 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, September 24-28, 2005, Long Beach, California, USA

### **National research collaboration**

Mats Leijon, Uppsala University, electromagnetic simulations in generators.

Lars Davidsson, Chalmers, fluid mechanics in hydropower turbines.

### **International research collaboration**

Matthew Cartmell, Glasgove University, electromagnetic simulations in generators.

Yokio Ishida, Nagoya University Japan. rotordynamics with electromagnetic interaction.

Tsuyoshi Inoue, Nagoya University, Japan, rotordynamics with electromagnetic interaction.

Antero Arkkio, Helsinki University of Technology, Div of Electromechanics, Espoo, Finland.

### **Presentations/ invited lectures**

J-O Aidanpää, H.H. Shen and R. Gupta, Chaos in Simple Shear Granular Flows, Society of Engineering Science, 28<sup>th</sup> Annual Technical Meeting, The University of Florida, Gainesville, USA, Nov. 6-8, 1991

J-O Aidanpää, H.H. Shen and R. Gupta, M. Babic', A Model for The Transitional Behaviour of Simple Shear Flows of Disks, Second U.S.-Japan Seminar on Micromechanics of Granular Materials, Clarkson Univeristy, Potsdam, NY, August 5-9, 1991

Aidanpää J, Shen H.H., Stability of shear layers in simple shear granular flow, MEET'N'93: First Joint ASCE/ASME/SES Meeting, Charlottesville, VA (USA), 6-9 Jun 1993. (World Meeting Number 932 5032)

Aidanpaa, J-O and Shen, H.H., "Experimental and Numerical Studies of Shear Layers in a Granular Shear Cell," U.S. National Congress on Applied Mechanics, Seattle, WA, June 1994.

Aidanpaa, J-O and Shen, H.H., "From Plastic to Power Law Fluid - A One-Dim Model of Granular Shear Flow," U.S. National Congress on Applied Mechanics, Seattle, WA, June 1994.

Periodic and chaotic behaviour of a threshold-limited two-degree-of-freedom system., Symposium on non-linear vibrations, November 8, 1990 at Gothenburg.



Periodic and chaotic behaviour of a threshold-limited two-degree-of-freedom system., SVIB conference, “Linking Analysis and Experiments in Vibration and Acoustic Calculation”, April 12-14, 1992, Riksgränsen, Sweden.

Practical methods to analyze nonlinear dynamics. Presentation at Glasgow University, Mars 10, 2005, UK.

Rotordynamic research at Luleå Technical university, Presented at Toyota Research Center, Nagoya, Japan, Sept 22, 2005.

Rotor dynamics in Wind Power ?, Uppsala University, Sweden 2006-10-20.

### **Book Chapters**

J-O Aidanpää, H.H. Shen, R. Gupta and M. Babic', A Model for The Transitional Behaviour of Simple Shear Flows of Disks, *Advances in Micromechanics of Granular Materials*, Elsevier, Amsterdam, ISBN: 0-444-89213-3, 1992, pp 301-310.