



44th European Rotorcraft Forum

Delft, The Netherlands

18-21 Sept 2018

Venue: TU Delft - Aula Conference Centre, Mekelweg 5, 2628 CC Delft

Monday September 17th

14:00 - 17:00 Registration open

Day 1 - Tuesday September 18th

Day 1 - Tuesday September 18th					
7:30	Registration open				
Auditorium					
8:45	Auditorium opens				
9:00	Welcome and Opening Speeches				
9:45	The Clean Sky 2 Fast Rotorcraft Initiatives: where are we today and where to next? by Ron van Manen (<i>CleanSky JU</i>)				
10:30	Coffee break				
11:00	GKN Fokker: From Past to Future Vertical Lift by Peter Kortbeek (GKN-Fokker), Training enhancement for the Defence Helicopter Command – The power of visionary needs analysis by Maj. Roland Blankenspoor (<i>DHC, RNAF</i>) & Anneke Nabben (<i>NLR</i>) Aviation challenges for the Global Energy Market by Tony Cramp & Alrik Hoencamp (<i>SHELL Aircraft</i>)				
12:30	Networking Lunch				
	Lecture Room	Senate Room	Frans van Hasselt Room	Commission Room 3	Commission Room 2
	Aerodynamics I Philippe Beaumier	Flight Mechanics I Marilena Pavel	Unmanned Rotorcraft I Richard Markiewicz	Dynamics I Pierangelo Masarati	Test & Evaluation I Klausdieter Pahlke
13:30	23 A Hybrid Navier-Stokes/ Viscous Vortex Particle Methodology for Modeling Maneuver Loads Sankar Lakshmi (Georgia Institute of Technology, USA)	108 Progress in the development of a time-to-contact autorotation cueing system Michael Jump (University of Liverpool, UK)	5 Impact scenarios for collisions with unmanned aerial vehicles and their consequences to rotorcraft Florian Franke (Tech Hochschule Ingolstadt, Germany)	49 Evaluation of a Slung Load Control System for Piloted Cargo Operations Daniel Benjamin Nonnenmacher (DLR, Germany)	
14:00	40 Aerodynamics of Single and Multiple Rotors Hovering Inside a Square Tunnel Yasutada Tanabe (JAXA, Japan)	25 Complementary Use of Black-Box and Physics-Based Techniques in Rotorcraft System Identification Susanne Seher-Weiss (DLR - Flight Systems, Germany)	59 Design space analysis of an autonomous aerial crane VTOL concept with a detachable airship envelope Yu Ito (Yamato Holdings Co., Ltd., Japan)	14 An extensive helicopter Ground Vibration Test: from pretest analysis to the study of non-linearities Martijn Priems (Airbus Helicopters GmbH, Germany)	86 Measurement of Transient Blade Passage Loads in a Coaxial Counter-Rotating Rotor in hover Daiju Uehara (The University of Texas at Austin, USA)
14:30	96 Numerical simulation of different rotor designs in hover and forward flight Thomas Fitzgibbon (University of Glasgow, UK)	20 Height-Velocity Diagram Analysis of a Variable Speed Rotor Helicopter Renliang Chen (Nanjing University, China)	51 The Tilt-Quadrotor: Modelling and Attitude Stabilization Ricardo Marques (Inst Superior Técnico, Uni Lisboa, Portugal)	41 Vibration Reduction Analyses using Individual Blade Pitch Controls for Lift-offset Rotors Jae-Sang Park (Chungnam National University, South Korea)	165 Measurement of rotorblade structural dynamics Simone Weber (Airbus Helicopters/Cranfield University, UK)
15:00	47 Rotor Airfoil Aerodynamic Design Method and Test Verification Lang He (CARDC, China)	10 Real Time Flight Dynamics Model Identification of Tilt-Rotor Aircraft Wei Wu (Nanjing University, China)	100 Human biodynamic models for rotorcraft comfort assessment Aykut Tamer (Politecnico Di Milano, Italy)	57 Helicopter Engine Air Intake Icing Wind Tunnel Certification Test Karel Lammers (NLR, Netherlands)	
15:30	Coffee break				
	Aerodynamics II Philippe Beaumier	Flight Mechanics II Marilena Pavel	Unmanned Rotorcraft II Richard Markiewicz	Dynamic II Pierangelo Masarati	Test & Evaluation II Klausdieter Pahlke
16:00	56 Investigation on Loss of Tail-rotor Effectiveness of Helicopter with Ducted Fan Tail Rotor Nahyeon Roh (Pusan National University, South Korea)	39 Low-Order Aeromechanics of Tilt-Rotor Helicopters Wesley Appleton (University of Manchester, UK)	18 A Physics-Based Approach to Urban Air Mobility Patricia Ventura Diaz (NASA Ames Research Center, USA)	69 Simulation of Active Flow Control Actuator Using CFD with Application to Rotor Blade Vibration Reduction Ryan Patterson (University of Michigan, USA)	107 Optimisation of differential infrared thermography for unsteady boundary layer transition measurement Christian Wolf (DLR, Germany)
16:30	66 Aerodynamic and Flight Mechanics Analysis of Airbus Helicopter's Compound Helicopter RACER in Hover under Crosswind Jakob Thiemeier (Universität Stuttgart, Germany)	30 Identification and Selection of Rotorcraft Candidate Models to Predict Handling Qualities and Dynamic Stability Johannes Wartmann (DLR, Germany)	143 Development of an Automatic System for Helicopter Approach to a Moving Vessel Sebastian Topczewski (Warsaw University of Technology)	16 Drivetrain Influence on the Lead-Lag Modes of Hingeless Helicopter Rotors Felix Armin Weiss (DLR, Germany)	168 Tracking dynamically scaled separating objects during a helicopter wind tunnel test Anton de Bruin (NLR, Netherlands)
17:00	98 An Experimental Investigation of Hub Drag Characteristic on Coaxial Rigid Rotor Aircraft Min Tang (CARDC, China)	53 Extensive analysis of hardover and trim-runaway failures on TLUH mathematical model based on cs-29 requirements Dogan Yildiz (TAI, Turkey)	178 The conceptual design of auto-rotary mono-wing decelerators based on Maple seeds as an entry-decent-landing system for Mars explorations Sepehr Sangin (TU-Clausthal, Germany)	21 Helicopter vibrations: a major comfort improvement through seat SARIB implementation Julien Guittou (Airbus Helicoptes, France)	174 Actively controlled trailing edge flaps with electromechanical actuation M.I. Myasnikov (Mil Moscow Helicopter Plant, Russia)

19:00 Welcome reception at Prinsenhof (Sint Agathaplein 1, Delft)

A guided city walking tour towards the reception departs 17:45 from TU Delft Conference Centre

Day 2 - Wednesday September 19th

8:00	Registration open				
	Lecture Room	Senate Room	Frans van Hasselt Room	Commission Room 3	Commission Room 2
	Aerodynamics III Klausdieter Pahlke	Flight Mechanics III Przemyslaw Bibik	Engine and Propulsion I Philippe Beaumier	Dynamic III Ruslan Mirgazov	Acoustics I Rainer Heger
9:00	13 Aerodynamic Investigation of Rotor / Propeller Interactions on a Fast Rotorcraft Ronan Boisard (ONERA, France)	161 Rotorcraft-pilot couplings: analysis and detection in a safety enhancement framework Simone Fasiello and Ying Yu (Politecnico di Milano, Italy)	33 Flight Testing and Analysis of Gas Turbine Engine Performance- A Multivariable Approach Ilan Arush (National Test Pilot School, USA)	144 Mixed-Sensitivity H_infinity On-Blade Control Jahaz Alotaibi (University of Leicester, UK)	77 Aero-acoustic analysis with a permeable surface for tip-jet rotor noise characterisation in hovering flight Kiro Kim (KonKuk University, South-Korea)
9:30	89 Experimental and numerical aerodynamic investigation of advanced tail boom designs based on optimised thick airfoil profiles Guillaume Legras (Airbus Helicopters, France)	118 Wind turbine wakes and helicopter operations: Overview of the Garteur HC-AG23 activities Richard Bakker (NLR, Netherlands)	38 Low Order Multidisciplinary Optimisation of Counter-Rotating Open Rotors Dale Smith (University of Manchester, UK)	84 Experimental Research on Whirl Flutter of Tiltrotor Aircraft Linghua Dong (Nanjing University, China)	50 The development of a European helicopter noise model Marthijn Tuinstra (NLR, Netherlands)
10:00	91 Numerical-Experimental Correlation of Rotor Flowfield in Ground Effect Claudio Pasquali (Roma Tre University, Italy)	36 Numerical investigations of the aerodynamics and handling qualities of a helicopter flying across a wind turbine wake Antonio Visingardi (CIRA, Italy)	113 An examination of hydrogen fuel cells and lithium-ion batteries for electric vertical take-off and landing (EVTOL) aircraft Wanyi Ng (University of Maryland, USA)		71 Design of a generic rotor noise source for helicopter fuselage scattering tests Jianping Yin (DLR, Germany)
10:30	Coffee break				
	Lecture Room				
11:00	The Electric VTOL Revolution by Mr. Mike Hirschberg (<i>Executive Director AHS—The Vertical Flight Society</i>)				
11:30	AHS Best Paper Award; "Avoiding Obstacles during Approach: DVE-Mitigation Flight Trials and Beyond" by Mr. Michael Zimmermann (DLR)				
12:00	ARF Best Paper Award; "A Study of Rotor/Wing Aerodynamic Interaction at High Speed Flight on a Compound Helicopter" by Mr. Hideaki Sugawara (JAXA)				
12:30	Networking Lunch				
	Lecture Room	Senate Room	Frans van Hasselt Room	Commission Room 3	Commission Room 2
	Aerodynamics IV Alan Irwin	Flight Mechanics IV Przemyslaw Bibik	Engine and Propulsion II Richard Markiewicz	Operational aspects Alrik Hoencamp	Crew Station & Human Factors Antoine de Reus
13:30	35 Experimental studies of non-stationary aerodynamic characteristics of a helicopter profile oscillating over the angle of the pitch Ruslan Mirgazov (TSAGI, Russia)	68 Load limiting control design for rotating blade root pitch link load using higher harmonic LTI models J.V.R. Prasad (Georgia Institute of Technology, USA)	55 Dynamic Simulation of a Rotorcraft Hybrid Engine in Simcenter Amesim Ioannis Roumeliotis (Cranfield University, UK)	17 Master Minimum Equipment List (MMEL) / Engine Time Limited Dispatch (TLD) on Helicopter Matthias Hatzak (Airbus Helicopters Deutschland, Germany)	94 Isomorphic Spatial Visual-Auditory Displays for Operations in DVE for Obstacle avoidance Martine Godfroy-Cooper (San Jose State Uni /NASA ARC, USA)
14:00	8 Orthogonal vortex-rotor interaction: impact on rotor controls, blade flapping, thrust and power Berend Van der Wall (DLR, Germany)	135 Reinforcement Learning Control for Helicopter Landing In Autorotation Kadircan Kopsa (Middle East Tech Uni, Turkey)	83 Simulation of a Compound-Split transmission for the UH-60 Pierre Paschinger (Zoerkler Gears, Austria)	67 Development and Validation of Physics Based Models for Ice Shedding Lakshmi Sankar (Georgia Inst. of Technology, USA)	132 Skyflight Mobile: a service to enhance the Leonardo flying experience Susanna Maria De Bernardi (Leonardo Helicopters, Italy)
14:30	110 Investigation of a Helicopter Model Rotor Wake Interacting with a Cylindrical Sling Load Antonio Visingardi (CIRA, Italy)	99 Modeling and Control of Lift Offset Coaxial and Tiltrotor Rotorcraft Tom Berger (US Army Aviation Develop, USA)	87 Performance Degradation Modelling of Rotorcraft Engines Operating in Brownout Conditions Matthew Ellis (University of Manchester, UK)	114 Determining a safe-distance guideline for helicopters near a wind turbine and wind park Richard Bakker (NLR, Netherlands)	133 Active Vibration Control for the Kazan ANSAT Bastian Kindereit (LORD Corporation, France)
15:00	117 Experimental Investigation of the Effects of Helicopter Rotor Tip Geometries on Aerodynamic Performance and Tip Vortex Sinem Uluocak (TAI, Turkey)	60 Estimation of Handling Quality Parameters of a Rotorcraft using Open-loop Linearized and Nonlinear Flight Dynamic Models Sakthivel Thangavel (Indian Institute of Technology, India)	155 AH-64 loss of lubrication study: Test of isotropic superfinished AH-64 (Apache) engine nose gearbox without black oxide coating Lane Winkelmann (REM Surface Engineering, Inc, USA)	11 Shipboard Landing Period Based on Dynamic Rollover Risk Prediction Binh Dang Vu (ONERA, France)	
15:30	Coffee break				
	Aerodynamics V Alan Irwin	Aircraft Design I Rainer Heger	Unmanned Rotorcraft III Przemyslaw Bibik	Simulation and training I Pierangelo Masarati	HUMS & Maintenance Lex ten Have
16:00	28 Improved Mars Helicopter aerodynamic rotor model for comprehensive analyses Witold Koning (NASA Ames Research Center, USA)	26 Development of Improved Rotor Blade Tip Shape Using Multidisciplinary Design Analysis and Optimization Joonbae Lee (KA, South Korea)	141 Simulation tools for UAV/OPV autorotation performance metrics evaluation Laurent Binet (ONERA, France)	145 Safety, quality and efficiency in flight data gathering Regine Pattermann (Reiser Simulation and Training, Germany) & Jos Stevens (NLR, the Netherlands)	3 A rugged fiber optics monitoring system for helicopter rotor blades Luigi Bottasso (Leonardo Helicopters, Italy)
16:30	15 Unsteady Aerodynamic Interaction between Rotor and Ground Obstacle Jianfeng Tan (Nanjing Tech University, China)	32 HOPLITE - A Conceptual Design Environment for Helicopters Incorporating Morphing Rotor Technology Kushagra Vidyarthi (Delft Uni of Technology, Netherlands)	104 Unified Framework for Analysis and Design Optimization of a Multirotor Unmanned Aerial Vehicle Daejin Lim (Seoul National University, South Korea)	45 Eigenmode distortion as a novel criterion for motion cueing fidelity in rotorcraft flight simulation Ivan Miletovic (Delft Uni of Technology, Netherlands)	22 Detecting Planetary Gear Bore Crack Wenyi Wang (Defence Science and Technology, Australia)
17:00		75 A Design-Centric Evaluation of Multi-Fidelity Aircraft Cost Modeling Approaches Rober Scott (US Army Aviation Development, USA)	175 Development of UAV rotor blades using RTM process Auke Jongbloed (KVE Composites, Netherlands)	125 Model Predictive Motion Cueing for a Helicopter Hover Task on an 8-DOF Serial Robot Simulator Frank Drop (Max Planck Institute, Germany)	119 Predictive Maintenance for Helicopter from Usage Data: Application to Main Gear Box Nassia Daouayry (Airbus Helicopters, France)
19:00	Conference dinner at paddle steamer 'De Majesteit' (Maasboulevard 100, Rotterdam) Bus departs 18:00 from TU Delft conference centre				

Day 3 - Thursday September 20th

8:00	Registration open				
	Lecture Room				
9:00	Opening of the Safety workshop				
9:10	EASA Rotorcraft Safety Strategy by David Solar (EASA)				
9:50	The Danger of speed instability below minimum power; a forgotten problem? by emeritus Professor Gareth Padfield				
10:30	Coffee break				
	Lecture Room	Senate Room	Frans van Hasselt Room	Commission Room 3	Commission Room 2
	Aerodynamics VI Alan Irwin	Safety Workshop Joost Vreeken	Systems, Avionics and Sensors Ivan Miletovic	Simulation and training II Jasper van de Vorst	Acoustics II Yves Delrieux
11:00	101 Higher-Order Simulations of Interactional Aerodynamics on Full Helicopter Configurations using a Hamiltonian Strand Approach Jannik Petermann (TU München, Germany)	200 Airbus Helicopters (AH) flight test safety management system	170 BladeSense – A novel approach for measuring dynamic helicopter rotor blade deformation Simone Weber (Airbus Helicopters/Cranfield University, UK)	70 Correlation of finite state multi-rotor dynamic inflow models with a high fidelity viscous vortex particle method J.V.R. Prasad (Georgia Institute of Technology, USA)	46 Towards a European helicopter noise calculation method Marthijn Tuinstra (NLR, Netherlands)
11:30	128 The Elevated Helipads – Study of Wind And Rotor Wash Influence for Most Common Configuration Types Adam Sieradzki (Instytut Lotnictwa, Poland)	Antoine van Gent (Airbus Helicopters, Germany) and Dominique Fournier (Airbus Helicopters, France)	42 Development of integrated avionics functions for external situation awareness in civil helicopter missions Omkar Halbe (Airbus Helicopters Deutschland, Germany)	79 Effectiveness of a Computer-Based Helicopter Trainer for Initial Hover Training Paolo Francesco Scaramuzzino (Technical University of Delft)	92 Boundary integral formulations for noise scattered by helicopter fuselage Caterina Poggi (Roma Tre University, Italy)
12:00	150 Prediction of Unsteady Aerodynamic Loads and Wake Structure of Wind Turbine in Yawed Inflow Hakjin Lee (Korea Advanced Institute of S&T, South Korea)	24 The potential of technologies to mitigate helicopter accident factors - status update and way forward Jos Stevens (NLR, Netherlands)	121 Research on Vision System for Degraded Visual Environment Kohei Funabiki (JAXA, Japan)	111 Investigation of Optic Flow, Time-to-Intercept, and Pilot Workload During Aggressive Approach-to-Hover Maneuvers Edward Bachelder (San Jose State University, USA)	116 Experimental and Numerical Investigation of Near-Field Rotor Aeroacoustics Robert Stepanov (Kazan National Research Technical University, Russia)
12:30	Networking Lunch				
	Aerodynamics VII Harmen van der Ven	Safety Workshop Jos Stevens	Aircraft Design II Luca Medici	Simulation and training III Jasper van der Vorst	Structures & Materials Martijn Priems
13:30		19 New technologies to enhance rotorcraft crash safety Dr. Akif O. Bolukbasi (The Boeing Company, USA)	58 Probabilistic approach and inertial Tolerancing for H/C ramp-up in production Mathieu Krebs (Airbus Helicopters, France)	131 An Objective Assessment Tool (gOAT) for Helicopter Pilot's performance Antoni Kopyt (Warsaw University of Technology, Poland)	90 Automation of structural cross sectional rotor blade modeling for aeromechanical rotor blade optimization Bram Van de Kamp (DLR, Germany)
14:00	140 Investigation on Hovering Rotors over Inclined Ground Planes - a Computational and Experimental Study Stefan Platzer (Technical University of Munich, Germany)	127 Cabin safety sensitivity to the mechanical parameters of the main crashworthy stages Paolo Astori (Politecnico di Milano, Italy)	81 Qualification and certification of Special Patrol Insertion & Extraction (SPIE) equipment for military helicopters Bart Timmerman (NLR, Netherlands)	138 Development of a civil light helicopter flight simulator for pilot training Urs Kazenmaier (Max Planck Institute, Germany)	43 Twist morphing of a hingeless rotor blade using a moving mass Mohammadreza Amoozgar (Swansea University, UK)
14:30	148 Implementation of aero-elastic capabilities in a LBM flow solver: application to a low-Reynolds rotor for micro-air vehicles Antonio Alguacil (ISAE-Supaero, France)	78 Rotorcraft loss of control in-flight - The need for research to support increased fidelity in flight training devices, including analogies Mark White (University of Liverpool, UK)	102 Conceptual Design Tradeoffs for Future Single Main Rotor Compound Helicopters Daniel Schrage (Georgia Tech, USA)	126 Initial Progress in Developing a Predictive Simulation Tool to Inform Helicopter Ship Operations Wajih Ahmed Memon (University of Liverpool, UK)	158 A Preprocessor for Parametric Composite Rotor Blade Cross-Sections Tobias Pflumm (Technische Universität München, Germany)
15:00	166 Application of Parametric Airfoil Design for Rotor Performance Improvement Joon Lim (US Army ADD, USA)	130 Embedding intelligent image processing algorithms: the new safety enhancer for helicopter missions Pierre Zoppitelli (Airbus Helicopters, France)	7 Dynamic extendable chord for improved helicopter rotor performance Dong Han (Nanjing University, China)		167 Vibration Fatigue Analysis of Horizontal Tail using Finite Element Method Vijaya Kumar Rayavarapu (RWRDC, HAL, India)
15:30	Coffee break				
	Aerodynamics VIII Harmen van der Ven	Safety Workshop Jos Stevens	Aircraft Design III Luca Medici	Flight Mechanics V Marilena Pavel	Test & Evaluation III Ruslan Mirgazov
16:00	147 Studies on the influence of rotor distance on the efficiency of a coaxial rotor system Matthias Kränzler (Robert-Bosch, Germany)	120 Evaluation of rotor blade models for rotor outwash Federico Rovere (CFD Laboratory School of Engineering, UK)	63 Universal geometric transformation method PGT for aircraft design Alexander Nikolsky (TsAGI, Russia)	156 Rotorcraft shipboard landing guidance using MPPI trajectory optimization J.V.R. Prasad (Georgia Institute of Technology, USA)	173 Some results of GARTEUR Action Group HC-AG 19 on Methods for Improvement of Structural Dynamic Finite Element Models Hans vanTangeren (NLR, Netherlands)
16:30	85 Experimental study of rotor and ship interference in the absence of ambient wind Jie Wu (CARDC, China)	109 CFD analysis for the helicopter wakes in ground effect Stefano Cavallo (CFD Laboratory School of Engineering, UK)	105 Development of a Conceptual Design Tool for Various Compound Helicopters Donguk Lee (Seoul National University, South Korea)	106 A generic ground dynamics model for ground handling evaluations Kaan Sansal (TAI, Turkey)	172 Using Multibody Dynamics for the Stability Assessment of a new Double-Swept Rotor Blade Setup Jürgen Arnold (DLR, Germany)
17:00	159 Aerodynamic analysis of helicopter in interaction with wind turbine's wake Theologos Andronikos (National Technical Uni of Athens, Greece)	171 Assessment of the feasibility of an extended range helicopter operational standard for offshore flights Myles Morelli (Politecnico di Milano, Italy)	154 Dynamic Stall Model Optimization with CFD and Assessment with Comprehensive Approach for Improved Blade Design Arda Yucekayali (TAI, Turkey)		80 An experimental study on the hover performance characteristics of the coaxial propellers configuration for the Drone Deog-Kwan Kim (KARI, South Korea)



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Day 4 - Friday September 21st (optional)

	Technical tour to Logistic Centre Woensdecht (LCW)
8:15	Assemble at the Conference Centre registration desk
8:30	Departure of the bus
10:00	Start of the tour
12:15	Lunch
13:00	Departure from LCW
14:00	Return at Delft
15:00	Arrival at Schiphol Airport

	Technical tour to Fokker / GKN
9:00	Assemble at the Conference Centre registration desk
9:15	Departure of the bus
10:00	Start of the tour
12:00	Lunch
13:00	Departure from Fokker / GKN
14:00	Return at Delft
15:00	Arrival at Schiphol Airport



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