

44th European Rotorcraft Forum

Delft, The Netherlands

18-20 Sept 2018

Modeling Manuser Loads Sonakar Lokshim Sonakar Lokshim Sonakar Lokshim Climbershy of Interpol, UN Task Sonakar Lokshim Climbershy of Interpo			Day 1	- Tuesday September 18th					
Keynote presentation of Update on the CleanSkyl Fast Rotorcraft Programs* by Ron van Maanen (CleanSkyl U)				Auditorium					
10.30 Coffee break 10.30 Foreign presentation by GNN-Fokker, Training enhancement for the Obeleace Helicopter Command - The power of visions ry seeds analysis* by Maj, Ruland Blanker-spoor (DKC, RNAF) Training enhancement for the Obeleace Helicopter Command - The power of visions ry seeds analysis* by Maj, Ruland Blanker-spoor (DKC, RNAF) Training enhancement for the Obeleace Helicopter Command - The power of visions ry seeds analysis* by Maj, Ruland Blanker-spoor (DKC, RNAF) Training enhancement for the Obeleace Helicopter Command - The Section Report of Visions ry seeds analysis by Maj, Ruland Blanker-spoor (DKC, RNAF) Training placement - Major of the Command - The Section Report of Visions ry seeds analysis by Maj, Ruland Blanker-spoor (DKC, RNAF) Training placement - Major of Report Report - Major of RNAF - Report Report Report - Report Report Report - Report Report Report Report - Report R	9:00	9:00 Welcome and Opening Speeches							
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Day 2 - Wednesday September 19th							
	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	161	33	144	77		
3.00	Aerodynamic Investigation of Rotor / Propeller Interactions on a Fast Rotorcraft	Rotorcraft-pilot couplings: analysis and detection in a safety enhancement framework	Flight Testing and Analysis of Gas Turbine Engine Performance- A Multivariable Approach	Mixed-Sensitivity H_infinity On-Blade Control	Aero-acoustic analysis with a permeable surface for tip-jet rotor noise characterisationin hovering flight		
	Ronan Boisard (ONERA, France)	Pierangelo Masarati (Politecnico di Milano, Italy)	Ilan Arush (National Test Pilot School, USA)	Jahaz Alotaibi (University of Leicester, UK)	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	118 Wind turbine wakes and helicopter operations. Overview of the Garteur HC-AG23 activities	38 Low Order Multidisciplinary Optimisation of Counter-Rotating Open Rotors	164 Stability analysis of whirl flutter in a nonlinear gimballed rotor-nacelle system	50 The development of a European helicopter noise model		
10:00	Guillaume Legras (Airbus Helicopters, France) 91	Richard Bakker (NLR, Netherlands) 36	Dale Smith (University of Manchester, UK) 72	Christopher Mair (University of Bristol, UK)	Marthijn Tuinstra (NLR, Netherlands) 71		
10.00	Numerical-Experimental Correlation of Rotor Flowfield in Ground Effect	Numerical investigations of the aerodynamics and handling qualities of a helicopter flying across a wind turbine wake	Experimental and Theoretical Considerations at Total Pressure Distortions on a Helicopter Turboshaft Engine		Design of a generic rotor noise source for helicopter fuselage scattering tests		
10:30	Claudio Pasquali (Roma Tre University, Italy)	Antonio Visingardi (CIRA, Italy)	Fabian Fuchs (TU-Dresden Germany) Coffee break		Jianping Yin (DLR, Germany)		
10.50			Lecture Room				
		by Mr. Mike Hirschberg (Execut			()		
	• •	ng Obstacles during Approach: D y of Rotor/Wing Aerodynamic In					
12:30	•	,	Networking Lunch		, ,		
	Lecture Room	Senate Room	Frans van Hasselt Room	Commission Room 3	Crow Station & Human Factors		
	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	68	55	17	94		
	Experimental studies of non-stationary aerodynamic characteristics of a helicopter profile oscillating over the angle of the pitch	Rotating Blade Root Pitch Link Load Estimation and Control	Dynamic Simulation of a Rotorcraft Hybrid Engine in Simcenter Amesim	Master Minimum Equipment List (MMEL) / Engine Time Limited Dispatch (TLD) on Helicopter	Isomorphic Spatial Visual-Auditory Displays for Operations in DVE for Obstacle avoidance		
	Ruslan Mirgazov (TsAGI, Russia)	J.V.R. Prasad (Georgia Institute of Technology, USA)	loannis Roumeliotis (Cranfield University, UK)	Matthias Hatzak (Airbus Helicopters Deutschland, Germany)	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	135 Reinforcement Learning Control for Helicopter Landing In Autorotation	83 Simulation of a Compound-Split transmission for the UH-60	67 Development and Validation of Physics Based Models for Ice Shedding	132 Skyflight Mobile: a service to enhance the Leonardo flying experience		
	Berend Van der Wall (DLR, Germany)	Kadircan Kopsa (Middle East Tech Uni, Turkey)	Pierre Paschinger (Zoerkler Gears, Austria)	Lakshmi Sankar (Georgia Inst. of Technology, USA)	Susanna Maria De Bernardi (Leonardo Helicopters, Italy)		
14:30	110 Investigation of a Helicopter Model Rotor Wake Interacting with a Cylindrical Sling Load	99 Modeling and Control of Lift Offset Coaxial and Tiltrotor Rotorcraft	87 Performance Degradation Modelling of Rotorcraft Engines Operating in Brownout Conditions	114 Determining a safe-distance guideline for helicopters near a wind turbine and wind park	133 Active Vibration Control for the Kazan ANSAT		
	Antonio Visingardi (CIRA, Italy)	Tom Berger (US Army Aviation Develop, USA)	Matthew Ellis (University of Manchester, UK)	Richard Bakker (NLR, Netherlands)	Bastian Kindereit (LORD Corporation, France)		
15:00	117 Experimental Investigation of the	60 Estimation of Handling Quality	155 Loss of Lubrication Test of Isotropic	11 Shipboard Landing Period Based on	111 Investigation of Optic Flow, Time-to-		
	Effects of Helicopter Rotor Tip	Parameters of a Rotorcraft using Open-	Superfinished AH-64 D (Apache) Engine	Dynamic Rollover Risk Prediction	Intercept, and Pilot Workload During		
	Geometries on Aerodynamic Performance and Tip Vortex Sinem Uluocak (TAI, Turkey)	loop Linearized and Nonlinear Flight Dynamic Models Sakthivel Thangavel (Indian Institute of Technology, India)	Nose Gearbox Without Black Oxide Coating Lane Winkelmann (REM Surface Engineering, Inc, USA)	Binh Dang Vu (ONERA, France)	Aggressive Approach-to-Hover Maneuvers Edward Bachelder (San Jose State University, USA)		
15:30	Aerodynamics V Alan Irwin	Aircraft Design I	Coffee break Unmanned Rotorcraft III Przemyslaw Bibik	Simulation and training I Pierangelo Masarati	HUMS & Maintenance Lex ten Have		
16:00	124	Rainer Heger 26	163	145	3		
	Spectral Galerkin Method for Rotor Induced Velocity Modelling	Development of Improved Rotor Blade Tip Shape Using Multidisciplinary Design Analysis and Optimization	Optimizing a multirotor propeller for hover performance given constraints on size and the use of consumer-grade additive man.	Safety, quality and efficiency in flight data gathering	A rugged fiber optics monitoring system for helicopter rotor blades		
	Raphaël Perret (ONERA, France)	Joonbae Lee (KAI, South Korea)	Lee Whitcher (Georgia Institute of Technology, USA)	Regine Pattermann (Reiser Simulation and Training, Germany) & Jos Stevens (NLR, the Netherlands)	Luigi Bottasso (Leonardo Helicopters, Italy)		
16:30	28 Generation of Mars Helicopter Aerodynamic Rotor Model for Comprehensive Analyses	32 HOPLITE - A Conceptual Design Environment for Helicopters Incorporating Morphing Rotor Technology	104 Unified Framework for Analysis and Design Optimization of a Multirotor Unmanned Aerial Vehicle	45 Eigenmode distortion as a novel criterion for motion cueing fidelity in rotorcraft flight simulation	22 Detecting Planetary Gear Bore Crack		
	Witold Koning (NASA Ames Research Center, USA)	Kushagra Vidyarthi (Delft Uni of Technology, Netherlands)	Daejin Lim (Seoul National University, South Korea)	Ivan Miletovic (Delft Uni of Technology, Netherlands)	Wenyi Wang (Defence Science and Technology, Australia)		
17:00	65 CFD-CSD coupled simulations of helicopter rotors using mapped Chebyshev pseudo-spectral method	75 A Design-Centric Evaluation of Multi- Fidelity Aircraft Cost Modeling Approaches	175 Development of UAV rotor blades using RTM process	125 Model Predictive Motion Cueing for a Helicopter Hover Task on an 8-DOF Serial Robot Simulator	119 Predictive Maintenance for Helicopter from Usage Data: Application to Main Gear Box		
	Dong Kyun Im (Youngsan University, South Korea)	Rober Scott (US Army Aviation Development, USA)	Auke Jongbloed (KVE Composites, Netherlands)	Frank Drop (Max Planck Institute, Germany)	Nassia Daouayry (Airbus Helicopters, France)		
17:30	15 Unsteady Aerodynamic Interaction between Rotor and Ground Obstacle	63 Universal geometric transformation method PGT for aircraft design	162 Modeling and simulation based analysis of a hybrid multirotor unmanned aerial vehicle concept	126 Initial Progress in Developing a Predictive Simulation Tool to Inform Helicopter Ship Operations	169 Fiber Bragg Grating Sensors toward Structural Health Monitoring in Composite Materials: Challenges and Solutions		
	Jianfeng Tan (Nanjing Tech University, China)	Alexander Nikolsky (TsAGI, Russia)	Derya Kaya (Middle East Tech University, Turkey)	Wajih Ahmed Memon (University of Liverpool, UK)	Arash Alvandi (Polimi, Italy)		
19:00	Conference dinner at paddle	steamer 'De Majesteit' (Bus	transport from TU Delft confe	rence centre)			
15.00 Commenced and the parameter of majesters pais transport from to believe inference centres							

		Day 3	- Thursday September 20th Lecture Room				
9:00	:00 Opening of the Safety workshop						
9:10	10 Keynote presentation on "EASA Rotorcraft Safety Strategy" by David Solar (EASA)						
9:50	Emeritus Professor Gareth Padf	ield - "The Danger of speed inst	ability below minimum power; a	forgotten problem?"			
10:30	Lastona Danie	County Doors	Coffee break	Commission Door 2	Commission Room 3		
	Lecture Room Aerodynamics VI	Senate Room Safety Workshop	Frans van Hasselt Room Systems, Avionics and sensors	Commission Room 3 Simulation and training II	Commission Room 2 Acoustics II		
	Alan Irwin	Joost Vreeken	Ivan Miletovic	Jasper van de Vorst	Yves Delrieux		
11:00	101 Higher-Order Simulations of Interactional Aerodynamics on Full Helicopter Configurations using a		170 BladeSense – A novel approach for measuring dynamic helicopter rotor blade deformation	31 A handling qualities insight of the FSTDs certification dynamic tests through linear state-space	46 Towards a European helicopter noise calculation methodology		
	Hamiltonian Strand Approach Jannik Petermann (TU München, Germany)	Airbus Helicopters (AH) flight test safety management system	Simone Weber (Airbus Helicopters/Cranfield University, UK)	identification Xavier Barral (ONERA, France)	Marthijn Tuinstra (NLR, Netherlands)		
11:30	128 The Elevated Helipads – Study of Wind And Rotor Wash Influence for Most Common Configuration Types		42 Development of Integrated Avionics Functions for Enhanced Crew Situation Awareness in Civil Helicopter Missions	70 Correlation of Finite State Multi-rotor Dynamic Inflow Models with CFD Data	92 Boundary integral formulations for noise scattered by helicopter fuselage		
	Adam Sieradzki (Instytut Lotnictwa, Poland)	Antoine van Gent (Airbus Helicopters, Germany) and Dominique Fournier (Airbus Helicopters, France)	Omkar Halbe (Airbus Helicopters Deutschland, Germany)	J.V.R. Prasad (Georgia Institute of Technology, USA)	Caterina Poggi (Roma Tre University, Italy)		
12:00	150 Prediction of Unsteady Aerodynamic Loads and Wake Structure of Wind Turbine in Yawed Inflow	24 The potential of technologies to mitigate helicopter accident factors - status update and way forward	121 Research on Vision System for Degraded Visual Environment	79 Effectiveness of a Computer-Based Helicopter Trainer for Initial Hover Training	116 Experimental and Numerical Investigation of Near-Field Rotor Aeroacoustics		
	Hakjin Lee (Korea Advanced Inst. of S&T, South Korea)	Jos Stevens (NLR, Netherlands)	Kohei Funabiki (JAXA, Japan)	Paolo Francesco Scaramuzzino (Technical University of Delft)	Robert Stepanov (Kazan National Research Technical University, Russia)		
12:30	Aerodynamics VII Harmen van der Ven	Safety Workshop Jos Stevens	Networking Lunch Aircraft Design II Luca Medici	Simulation and training III Jasper van der Vorst	Structures & Materials Martijn Priems		
13:30	142 The influence of the state of flight on a	19 New technologies to enhance	58 Probabilistic approach and inertial	153 Structure and performance of rotor	90 Automation of structural cross		
	helicopter cooling	rotorcraft crash safety	Tolerancing for H/C ramp-up in production	wake formulation based on differential algebraic equations			
14:00	Katarzyna Surmacz (Institute of Aviation, Poland) 140	Dr. Akif O. Bolukbasi (The Boeing Company, USA) 127	Mathieu Krebs (Airbus Helicopters, France) 81	Diego Hidalgo (Uni Pontificia Bolivariana, Colombia) 138	Bram Van de Kamp (DLR, Germany) 43		
14.00	Investigation on Hovering Rotors over Inclined Ground Planes a Computational and Experimental Study Stefan Platzer	Cabin safety sensitivity to the mechanical parameters of the main crashworthy stages	Qualification and certification of Special Patrol Insertion & Extraction (SPIE) equipment for military helicopters	Development of a civil light helicopter flight simulator for pilot training	Twist morphing of a hingeless rotor blade using a moving mass		
44.20	(Technical University of Munich, Germany) 148	Paolo Astori (Politecnico di Milano, Italy) 78	Natalie Münninghoff (NLR, Netherlands) 102	Urs Kazenmaier (Max Planck Institute, Germany) 131	Mohammadreza Amoozgar (Swansea University, UK) 158		
14:30	Implementation of aero-elastic capabilities in a LBM flow solver: application to a low-Reynolds rotor for	Rotorcraft loss of control in-flight - The need for research to support increased fidelity in flight training devices,	Conceptual Design Tradeoffs for Future Single Main Rotor Compound Helicopters	An Objective Assessment Tool (gOAT) for Helicopter Flight Simulator	A Preprocessor for Parametric Composite Rotor Blade Cross-Sections		
	Antonio Alguacil (ISAE-Supaero, France)	Mark White (University of Liverpool, UK)	Daniel Schrage (Georgia Tech, USA)	Antoni Kopyt (Warsaw University of Technology, Poland)	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)	4 Optimization of Preliminary Design Process For a Medium Lift Multi Role Helicopter Abdul Rashid Tajar (HAL, India)		167 Vibration Fatigue Analysis of Horizontal Tail using Finite Element Method Vijaya Kumar Rayavarapu (RWRDC, HAL, India)		
15:30	, , , , , , , , , , , , , , , , , , , ,	,,,	Coffee break		, , , , , , , , , , , , , , , , , , , ,		
16:00	Aerodynamics VIII Harmen van der Ven 147	Safety Workshop Jos Stevens 120	Aircraft Design III Luca Medici 113	Flight Mechanics V Marilena Pavel 156	Test & Evaluation III Ruslan Mirgazov 173		
10.00	Influence of the rotor distance on efficiency of a coaxial rotor system powered by electrical drives for VTOL aircraft	Evaluation of rotor blade models for rotor outwash Umberto Morelli	Fuel Cell and Battery Hybrid Power Architecture for Electric VTOL	Rotorcraft shipboard landing guidance using MPPI trajectory optimization	Some results of GARTEUR Action Group HC-AG 19 on Methods for Improvement of Structural Dynamic Finite Element Models		
	Matthias Kränzler (Robert-Bosch, Germany)	(CFD Laboratory School of Engineering, UK)	Wanyi Ng (University of Maryland, USA)	J.V.R. Prasad (Georgia Institute of Technology, USA)	Hans vanTongeren (NLR, Netherlands)		
16:30	85 Experimental study of rotor and ship interference in the absence of ambient wind	109 CFD analysis for the helicopter wake in ground effect	105 Development of a Conceptual Design Tool for Various Compound Helicopters	157 Nonlinear optimal adaptive transition control of a tilt-prop VTOL UAV	172 Using Multibody Dynamics for the Stability Assessment of a new Double- Swept Rotor Blade Setup		
	Jie Wu (CARDC, China)	Gianmarco Ducci (CFD Laboratory School of Engineering, UK)	Donguk Lee (Seoul National University, South Korea)	Murat Senipek (Middle East Technical University, Turkey)	Jürgen Arnold (DLR, Germany)		
17:00	159 Aerodynamic analysis of helicopter in interaction with wind turbine wakes Theologos Andronikos	171 Assessment of the feasibility of an extended range helicopter operational standard for offshore flights	154 Dynamic Stall Model Optimization with CFD and Assessment with Comprehensive Approach for Improved Blade Design	106 A generic ground dynamics model for ground handling evaluations	An experimental study on the hover performance characteristics of the coaxial propellers configuration for the Drone		
47.00	(National Technical Uni of Athens, Greece)	Myles Morelli (Politecnico di Milano, Italy)	Arda Yucekayali (TAI, Turkey) 7	Kaan Sansal (TAI, Turkey) 141	Deog-Kwan Kim (KARI, South Korea)		
17:30			Dynamic Extendable Chord to Improve Helicopter Rotor Performance	141 Simulation tools for UAV/OPV autorotation performance metrics evaluation	74 Experimental Investigation of OA212 Airfoil Dynamic Stall Control Using DBD Plasma Actuators		
			Dong Han (Nanjing University, China)	Laurent Binet (ONERA, France)	Chang Zhiqiang (CARDC, China)		