AGT0000/JM/CDT January 2014

Re. : Research Master in Fluid Dynamics (former "VKI Diploma Course") 2014-2015

Thank you for your interest concerning the VKI Research Master in Fluid Dynamics.

The application form is enclosed. Please complete the form carefully and return 1 original as well as 1 copy at your earliest convenience to the VKI secretariat. Recommendations of three of your current professors are required. Please write their names in the appropriate place on the application forms and give each of them one of the enclosed recommendation forms.

VKI fellowships will be offered to qualified candidates from the countries participating in the funding of VKI ^(*) and new NATO member countries ^(**), and no tuition fee applies.

For candidates from other countries, see details inside this application document.

Applications received prior to $\underline{1 \text{ April 2014}}$ will be given priority in the award of a VKI fellowship.

Yours sincerely,

Jean MUYLAERT Director

(*) VKI funding countries : Belgium, Czech Republic, France, Germany, Greece, Hungary, Iceland, Italy, Luxemburg, Norway, Portugal, Romania and Turkey.

(**) New NATO member countries : Albania, Bulgaria, Croatia, Estonia, Latvia, Lithuania, Slovakia and Slovenia.

VON KARMAN INSTITUTE FOR FLUID DYNAMICS

APPLICATION FOR ADMISSION TO THE

VKI RESEARCH MASTER IN FLUID DYNAMICS (former "VKI Diploma Course")

2014-2015

Attach Photograph Here

PLEASE TYPE OR PRINT

I.

PERSONAL INFORMATION	
1. Family name	:
2. First name	:
3. Home address	:
Home telephone number	:
4. Office address	:
Office telephone and fax numbers	:
Office e-mail address	:
Personal Email address	:
5. Place and date of birth	:
6. Marital status	:
7. Number and ages of children	:
8. Will your family accompany you ?	:
9. Do you need any special accommodation or assistance relative to your state of health ? (optional)	:
10. Nationality a) at birth	:
b) now	:
11. Dates of military service	:
12. Do you have outstanding military obligations ?	:

II. EDUCATION

III.

IV.

Universities and higher education institutions		Dates attended from : to :		Degrees or diplomas (Ing.Civ., Dipl.Ing., B.S., M.S., etc.)
Give an indication of	performanc	e in the above i	nstitutions by gra	ade average (with an explanation
of the marking system)	, and by list	ting honours and	i scholarships he	ld.
Attach official grade to courses followed, with electronics, mathematic	canscripts. I particular cs, experim	f not available, attention to the ental aerodynam	attach another she standard reachenics, and FORTR	neet giving details of engineering of in theoretical fluid mechanics AN, C or C ⁺⁺ programming.
EXPERIENCE				
Firm or institution (inc the VKI) and address	luding	Dates		Responsibilities, specific work carried out
Attach an additional pa	ige if you w	rish to provide fu	urther details.	
LANGUAGES				
Indicate below the leve	el of your ca	pability in :		
]	Reading	Writing	Conversation	n Understanding
English :				
French :				

Applicants coming from universities where tuition is not made in English or French may be asked to take a TOEFL test.

V. FINANCIAL INFORMATION

Tuition fees

There is no tuition fee for citizens of Albania, Belgium, Bulgaria, Czech Republic, Croatia, Estonia, France, Germany, Greece, Hungary, Iceland, Italy, Latvia, Lithuania, Luxemburg, Norway, Portugal, Romania, Slovakia, Slovenia and Turkey.

A tuition fee of 10.000 euro is applicable to citizens of Canada, Denmark, The Netherlands, Poland, Spain^(*), the U.K. and the U.S.A.

A tuition fee of 30.000 euro is applicable to nationals of all other countries and approval by the Board of VKI is required.

Fellowships to cover cost of living

The VKI will consider the award of a fellowship to a <u>qualified</u> candidate who will have <u>no other</u> <u>means</u> of financial support and who demonstrates that efforts to obtain external financial support have failed. The amount of the VKI fellowship is sufficient to cover <u>basic</u> living costs.

Please initiate contacts with potential fellowship sources in your country as soon as possible and indicate below the potential sources of funding which you will explore.

Please note that **no VKI fellowship** is available for citizens of Canada, Denmark, the Netherlands, Poland, Spain^(*), the United Kingdom and U.S.A.

Do you wish to be considered for a VKI fellowship?

Applications received before 1 April will be given priority concerning financial assistance.

VI. REFERENCES

Ask three qualified persons to fill in the attached recommendation forms and indicate below their names, positions, complete addresses, telephone numbers, and, if available, a telefax and/or electronic mail number.

1.	
2.	
3.	

(*) the decision for Spain applies only for the academic year 2014-15 and is under re-negotiation for the years after.

VII. CURRENT INTERESTS AND FUTURE PLANS

Describe briefly the topic of your thesis or final-year project or recent research. Attach an additional page if you wish to provide further details.

Describe briefly your career plans after completing your studies at the VKI. What do you expect to learn at the VKI which will help you to fulfil these plans ?

VIII. PROGRAMME OF STUDY AT THE VKI

Please consult the website of the VKI (<u>http://www.vki.ac.be</u>) and after examining the description of the research activities indicate below what type of research field, active at VKI, you would be interested in. Please note that not all research topics will be available.

Consult as well the description of the courses and the course syllabus and on this basis indicate the type of courses you are interested in. Courses should somewhat be linked to the research project and most of them are organized within a department of the VKI. Common courses are compulsory.

Link to research activities and to description of courses: VKI WEB on the application form banner

Type of research field you are interested in :

What is your background in applied mathematics?

What is your background in programming in FORTRAN, in C or in C++, including code development and debugging?

What is your background in UNIX, LINUX or Windows operating systems?

If accepted to the VKI Research Master in Fluid Dynanics, you will be assigned to a specific department and for a specific option (experimental or numerical). Changes at a later date will be possible only if the department concerned agrees.

IX. DECLARATION OF THE CANDIDATE

I declare that the information given above is correct and that I am not aware that I have omitted anything which would adversely affect a decision to admit me to the von Karman Institute. Furthermore, I declare that I will inform the von Karman Institute of any external financial support I will receive during my proposed year of study at the VKI.

Signature

Date

Return both copies of the application form to :

von Karman Institute for Fluid Dynamics 72 Chaussée de Waterloo B - 1640 Rhode-Saint-Genèse

ACTIVE RESEARCH TOPICS AT VKI Indicate the department in which you wish to work and then indicate your interests placing numbers from 1 to 5 next to the project titles listed below (1 being your main interest); in case you are interested in more than one department, please indicate the order of preference between departments.

AERONAUTICS/AEROSPACE	Nature*
 ATMOSPHERIC RE-ENTRY FLOWS O Re-entry capsule aerothermodynamics and stability. O Shock wave/boundary layer interactions in supersonic or hypersonic flows; fins, ramps and corner flows O Simulation of re-entry capsule aerothermodynamics and computation of viscou non equilibrium hypersonic flows using upwind FV or RDS methods O Rarified flow gas dynamics and particle flow (DSMC) 	E E,N IS N N
 PLASMA WIND TUNNEL and THERMAL PROTECTION SYSTEMS O Intrusive/non-intrusive measurements in (ICP) plasma facilities and validation by numerical simulation O Spectroscopic diagnostics for plasma flows O Modeling and simulation methods for plasma flows 	E,N E N
 NON-INTRUSIVE MEASUREMENT TECHNIQUES FOR HIGH SPEED FLOW laser Doppler velocymetry in high speed (subsonic/supersonic) flow laser Particle Image Velocimetry in high speed (subsonic/supersonic) flow Infrared thermography for heat transfer in hypersonic flows 	N E E E
 AEROACOUSTICS O Acoustic beamforming applied to wind tunnel testing of airframe configuration O Development and validation of prediction methods for airframe noise. 	ıs. N,E N,E
SMALL SATELLITES O Developments of reentry cube sat	N,E
 TURBULENCE Stability and transition to turbulence for a laminar hypersonic boundary layer; Natural and roughness induced mechanisms Compressible Direct Numerical Simulation and Large Eddy Simulation on unstructured grids with Residual distribution. 	N,E N
UNCERTAINTY QUANTIFICATION IN CFD O application to space reentry aerodynamics and plasma flows	E, N
 SPACE WEATHER PREDICTION O Simulation and modelling of plasma flows related to interaction of the solar with the earth magnetic field, coronal mass ejections 	ind N
 COMPUTATIONAL FLUID DYNAMICS ALGORITHMIC DEVELOPMENTS O Acceleration of flow solvers by advanced parallel computing platforms (GPGF O High order discretization methods for compressible flow simulation: Residual Distribution and discontinuous Galerkin Finite Element Methods O Acceleration of flow solvers by advanced CFD algorithms (multigrid, implicit methods) O Adjoint methods for error estimation and adaptive grid simulation 	YU) N N N N

- * Nature of subject : E = ExperimentalN = Numerical

 - T = Theoretical

ENVIRONMENTAL AND APPLIED FLUID DYNAMICS

 AEROACOUSTICS O Aerodynamic noise control using porous liners. O Development and validation of hybrid noise prediction methods for confined flows. O Investigation of low speed cooling fan noise for ground transportation. 	E,N,T E,N E,N
 AERODYNAMICS OF GROUND VEHICLES O Ahmed body, solar car. O High speed train. 	E,N E,N
 HEAT TRANSFER Heat transfer in buildings and industrial flows. Free and forced convective flows over and around obstacles. Convective enhancement and impinging jets. Thermohydraulics of liquid metal reactors. 	E,N E,N E,N E,N
 INSTRUMENTATION O Particle Image Velocimetry. O Particle diagnostics using laser techniques. O Infrared thermometry and inverse method. 	E E E
 MULTIPHASE FLOWS O Dynamics of particles, droplets and/or bubbles in dispersed two-phase flows. O Sprays and flashing phenomena O Dynamics of Gas-Liquid Interfaces and sloshing phenomenon. O Two-phase hammer. O Nano-particle flow: sizing, filtration and passivation. 	E,N E,N E,N E,N E,N
 TURBULENCE O Investigation of coherent structures in turbulent flows. O Numerical simulation of turbulent flows in complex geometries. 	E,N N
 WIND TECHNOLOGY O Wind effects on structures and people. O Renewable energy: wind resources assessment for Wind Turbines. O Urban wind turbines. O Weather forecasting. O Dispersion of pollutants in built environment. 	E,N E,N E,N E,N E,N

- * Nature of subject : E = ExperimentalN = NumericalT = Theoretical

- 7 -

	Experimental validation of a high temperature (1100°C) cooled fast response pressure probe for HP turbine stage measurements.	Е
	Preliminary design of a high temperature cooled pneumatic and fast response directional pressure probe.	E
	Development of a fast response static pressure probe.	N,E
	Non-intrusive measurement technique for internal cooling passages.	E
	Convective heat transfer and/or aerodynamic measurements in internal cooling channels.	E
	Measurement of low Re flows in rotating channels.	E
	Testing of high lift / high load turbine blade.	E
	Effect of surface roughness on turbine blade performance at low RE number.	E
	Investigation of the HP – LP interaction in a transonic 1.5 turbine stage.	E, N
	Steady and unsteady pressure, temperature and heat transfer measurements in rotation.	Е
	Design and analysis of contra-rotating turbines.	Ν
	Investigation of transition in supersonic flows.	E, T, N
	Research on pulsating coolant flows in transonic turbines.	Е
	Analysis and optimization of turbine based and rocket based combined cycles.	T, N
	Multipoint optimisation of radial impellers and low solidity diffusers.	Ν
	Multi-objective optimisation of turbomachinery.	T, N
	Optimisation of a 3D fan for automotive cooling.	Ν
	Optimisation of a micro gas turbine cycle (steady and transients).	Т
	Aero-thermal effects in tip gap flows.	E
	Steady and unsteady pressure measurements in an axial compressor stage.	E
	Experimental study of the seal leakage flow in axial compressor stage.	E
	Experimental investigation of clocking effects in an axial compressor stage.	E
	3D NS computations of the flow field in an axial compressor including a parametric study of casing treatment.	N
	3D Aerodynamic design of an axial compressor stage including lean, sweep and hub wall contouring.	N
	Tip timing and tip clearance measurements in an axial compressor and turbine stage.	Е
* Natu	re of subject : $E = Experimental$ N = Numerical	

T = Theoretica

- 8 -

Nature*

TURBOMACHINERY AND PROPULSION

von KARMAN INSTITUTE FOR FLUID DYNAMICS

APPRAISAL FORM

TO THE APPLICANT :	This form should be given to a person who is in a position to comment on your qualifications for advanced study.			
Before submitting this form	n to the appraise	r, please complete the f	ollowing :	
(1) Your name				
	last	first	middle	
(2) Address				
(3) Name and address of p	erson who will c	omplete this form :		
TO THE PERSON WRITI	NG THE APPR	AISAL : This form is g the applicant's	iven to you for a confide qualifications for advanc	ntial opinion of ed study.

- (1) What is your opinion concerning the applicant's :
 - *a) character and personality*
 - *b) analytical abilities and power of independent and creative work*
- (2) Comparing this candidate with his (her) colleagues, do you rank him (her) among the upper 5 %, 10 % or 25 %

(upper 5 %)

(upper 10 %)

(upper 25 %)

(3) Please cite any additional information bearing on this application

SIGNED _____ DATE _____

Please send this confidential appraisal to the Director, von Karman Institute for Fluid Dynamics, 72 Chaussée de Waterloo, 1640 Rhode-Saint-Genèse, Belgium.

von KARMAN INSTITUTE FOR FLUID DYNAMICS

APPRAISAL FORM

ТО Т	O THE APPLICANT : This form should be given to a person who is in a position to comment or your qualifications for advanced study.						
Befor	re submitting this fo	rm to the appraise	r, please complete the f	following :			
(1) Ya	our name	last	first	middle			
(2) <i>A</i>	ddress						
(3) N	ame and address of	person who will c	omplete this form :				
ТО Т	HE PERSON WRI	TING THE APPRA	AISAL : This form is g the applicant's	given to you for a con s qualifications for adv	ifidential opinion of vanced study.		
(1)	What is your opin	tion concerning the	e applicant's :				
	a) character	and personality					
	b) analytical	abilities and powe	er of independent and c	reative work			
(2)	Comparing this c 5 %, 10 % or 25 y	andidate with his (%	her) colleagues, do you	ı rank him (her) amor	ng the upper		
	(upper 5 %)		(upper 10 %)		(upper 25 %)		
$\langle 0 \rangle$		11 1. 6	1 1 1	1			

(3) Please cite any additional information bearing on this application

SIGNED _____ DATE _____

Please send this confidential appraisal to the Director, von Karman Institute for Fluid Dynamics, 72 Chaussée de Waterloo, 1640 Rhode-Saint-Genèse, Belgium.

von KARMAN INSTITUTE FOR FLUID DYNAMICS

APPRAISAL FORM

TO TH	OTHE APPLICANT : This form should be given to a person who is in a position to comment on your qualifications for advanced study.						
Before	e submitting this form	n to the appraiser	; please complete the j	following :			
(1) Yo	ur name	last	first	middle			
(2) Ad	dress						
(3) Na	me and address of p	person who will co	omplete this form :				
TO TH	HE PERSON WRIT	ING THE APPRA	AISAL : This form is the applicant	given to you for a con s qualifications for adv	fidential opinion of vanced study.		
(1)	What is your opini	on concerning the	applicant's :				
	a) character a	and personality					
	b) analytical d	ubilities and powe	r of independent and o	creative work			
(2)	Comparing this candidate with his (her) colleagues, do you rank him (her) among the upper 5 %, 10 % or 25 %						
	(upper 5 %)		(upper 10 %)		(upper 25 %)		
TO TH (1) (2)	HE PERSON WRIT What is your opini a) character a b) analytical a Comparing this ca 5 %, 10 % or 25 % (upper 5 %)	ING THE APPRA on concerning the and personality abilities and powe	AISAL : This form is the applicant's : or of independent and of ther) colleagues, do you	given to you for a con s qualifications for adv creative work u rank him (her) amon	fidential opin vanced study.		

(3) Please cite any additional information bearing on this application

SIGNED _____ DATE _____

Please send this confidential appraisal to the Director, von Karman Institute for Fluid Dynamics, 72 Chaussée de Waterloo, 1640 Rhode-Saint-Genèse, Belgium.