AGT0000/JM/CDT
January 2013

Re. : Research Master in Fluid Dynamics (former "VKI Diploma Course") 2013-2014

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. The VKI will submit your application to the RTO* National Delegate of your country for approval.

VKI fellowships will be offered to qualified candidates who are unable to obtain sufficient funds in their own country. If we are aware of the existence of financial support in your country, we have joined the information to the application form.

Applications received prior to **1 April 2013** will be given priority in the award of a VKI fellowship.

Yours sincerely,

Jean MUYLAERT
Director

* NATO Research and Technology Organisation

VON KARMAN INSTITUTE FOR FLUID DYNAMICS

APPLICATION FOR ADMISSION TO THE

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

2013-2014

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

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 performance in the above institutions by grade average (with an explanation of the marking system), and by listing honours and scholarships held.

_____

_____

_____

_____

Attach official grade transcripts. If not available, attach another sheet giving details of engineering courses followed, with particular attention to the standard reached in theoretical fluid mechanics, electronics, mathematics, experimental aerodynamics, and FORTRAN, C or C^{++} programming.

III. EXPERIENCE

Firm or institution (including the VKI) and address	Dates	Responsibilities, specific work carried out
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Attach an additional page if you wish to provide further details.

IV. LANGUAGES

Indicate below the level of your capability in :

	Reading	Writing	Conversation	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

Fees

There is no tuition fee for citizens of Albania, Belgium, Bulgaria, Czech Republic, Croatia, Estonia, France, Germany, Hungary, Iceland, Italy, Latvia, Lithuania, Luxemburg, Norway, Portugal, Romania, Slovakia, Slovenia, Spain and Turkey.
Citizens of Canada, Denmark, Greece, The Netherlands, Poland, the U.K. and the U.S.A. may receive information on the tuition fee by writing to the Director, von Karman Institute.

Fellowships to cover cost of living

Please indicate below the name and address of the fellowship program in your country to which you will make application and send to the VKI a copy of the application. You should initiate contacts with potential fellowship sources in your country as soon as possible. Keep us informed of any results, positive or negative.

_____

_____

_____

_____

The VKI will consider the award of a fellowship to a qualified candidate who will have no other means 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 basic living costs.

Do you wish to be considered for a VKI fellowship ? _____

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

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

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._____

_____

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 (http://www.vki.ac.be) 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
- ○ Re-entry capsule aerothermodynamics and stability. E
- ○ Shock wave/boundary layer interactions in supersonic or hypersonic flows; fins, ramps and corner flows E,N
- ○ Simulation of re-entry capsule aerothermodynamics and computation of viscous non equilibrium hypersonic flows using upwind FV or RDS methods N
- ○ Rarified flow gas dynamics and particle flow (DSMC) N

☐ PLASMA WIND TUNNEL and THERMAL PROTECTION SYSTEMS
- ○ Intrusive/non-intrusive measurements in (ICP) plasma facilities and validation by numerical simulation E,N
- ○ Spectroscopic diagnostics for plasma flows E
- ○ Modeling and simulation methods for plasma flows N

☐ NON-INTRUSIVE MEASUREMENT TECHNIQUES FOR HIGH SPEED FLOW
- ○ laser Doppler velocymetry in high speed (subsonic/supersonic) flow E
- ○ laser Particle Image Velocimetry in high speed (subsonic/supersonic) flow E
- ○ Infrared thermography for heat transfer in hypersonic flows E

☐ AEROACOUSTICS
- ○ Acoustic beamforming applied to wind tunnel testing of airframe configurations. N,E
- ○ Development and validation of prediction methods for airframe noise. N,E

☐ SMALL SATELLITES
- ○ Developments of reentry cube sat N,E

☐ TURBULENCE
- ○ Stability and transition to turbulence for a laminar hypersonic boundary layer; Natural and roughness induced mechanisms N,E
- ○ Compressible Direct Numerical Simulation and Large Eddy Simulation on unstructured grids with Residual distribution. N

☐ UNCERTAINTY QUANTIFICATION IN CFD
- ○ application to space reentry aerodynamics and plasma flows E, N

☐ SPACE WEATHER PREDICTION
- ○ Simulation and modelling of plasma flows related to interaction of the solar wind with the earth magnetic field, coronal mass ejections N

☐ COMPUTATIONAL FLUID DYNAMICS ALGORITHMIC DEVELOPMENTS
- ○ Acceleration of flow solvers by advanced parallel computing platforms (GPGPU) N
- ○ High order discretization methods for compressible flow simulation: Residual Distribution and discontinuous Galerkin Finite Element Methods N
- ○ Acceleration of flow solvers by advanced CFD algorithms (multigrid, implicit methods) N
- ○ Adjoint methods for error estimation and adaptive grid simulation N

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* Nature of subject : E = Experimental
N = Numerical
T = Theoretical

☐ ENVIRONMENTAL AND APPLIED FLUID DYNAMICS

Nature*

☐ AEROACOUSTICS

- ○ Aerodynamic noise control using porous liners. E,N,T
- ○ Development and validation of hybrid noise prediction methods for confined flows. E,N
- ○ Investigation of low speed cooling fan noise for ground transportation. E,N

☐ AERODYNAMICS OF GROUND VEHICLES

- ○ Ahmed body, solar car. E,N
- ○ High speed train. E,N

☐ HEAT TRANSFER

- ○ Heat transfer in buildings and industrial flows. E,N
- ○ Free and forced convective flows over and around obstacles. E,N
- ○ Convective enhancement and impinging jets. E,N
- ○ Thermohydraulics of liquid metal reactors. E,N

☐ INSTRUMENTATION

- ○ Particle Image Velocimetry. E
- ○ Particle diagnostics using laser techniques. E
- ○ Infrared thermometry and inverse method. E

☐ MULTIPHASE FLOWS

- ○ Dynamics of particles, droplets and/or bubbles in dispersed two-phase flows. E,N
- ○ Sprays and flashing phenomena E,N
- ○ Dynamics of Gas-Liquid Interfaces and sloshing phenomenon. E,N
- ○ Two-phase hammer. E,N
- ○ Nano-particle flow: sizing, filtration and passivation. E,N

☐ TURBULENCE

- ○ Investigation of coherent structures in turbulent flows. E,N
- ○ Numerical simulation of turbulent flows in complex geometries. N

☐ WIND TECHNOLOGY

- ○ Wind effects on structures and people. E,N
- ○ Renewable energy: wind resources assessment for Wind Turbines. E,N
- ○ Urban wind turbines. E,N
- ○ Weather forecasting. E,N
- ○ Dispersion of pollutants in built environment. E,N

* Nature of subject : E = Experimental
N = Numerical
T = Theoretical

	TURBOMACHINERY AND PROPULSION	Nature*
☐	Experimental validation of a high temperature (1100°C) cooled fast response pressure probe for HP turbine stage measurements.	E
☐	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.	E
☐	Design and analysis of contra-rotating turbines.	N
☐	Investigation of transition in supersonic flows.	E, T, N
☐	Research on pulsating coolant flows in transonic turbines.	E
☐	Analysis and optimization of turbine based and rocket based combined cycles.	T, N
☐	Multipoint optimisation of radial impellers and low solidity diffusers.	N
☐	Multi-objective optimisation of turbomachinery.	T, N
☐	Optimisation of a 3D fan for automotive cooling.	N
☐	Optimisation of a micro gas turbine cycle (steady and transients).	T
☐	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.	E

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* Nature of subject : E = Experimental
N = Numerical
T = Theoretica

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 to the appraiser, please complete the following :

(1) *Your name*_____
last *first* *middle*

(2) *Address* _____

(3) *Name and address of person who will complete this form :* _____

_____

TO THE PERSON WRITING THE APPRAISAL : This form is given to you for a confidential opinion of the applicant's qualifications for advanced 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.

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