AGT0000/JM/CDT
January 2014

Thank you for your letter concerning a training period at VKI. An application form is enclosed; please complete and return it at your earliest convenience. Preference will be given to applications received before **1 April 2014.**

Consideration by VKI of your application will be contingent on letters of recommendation from two of your current professors. Please write their names in the appropriate place on the application form, and give each of them one of the enclosed recommendation forms.

To provide a valuable learning experience, the training period should have a duration of two or three months. It could start any time during the year, except in September. In exceptional cases, longer periods may be possible.

There is no fee associated with this program for students of NATO countries. A limited number of fellowships are available to support highly qualified students who are unable to obtain sufficient funds from their own university or from one of the programs of the European Union.

The Institute is not able to provide lodging; however there exist possibilities for pensions and small apartments that can be rented by the month. Our Secretariat will help you to find accommodation on your arrival.

We look forward to receiving your application form.

Yours sincerely,

Jean MUYLAERT,
Director

Encl.

von Karman Institute for Fluid Dynamics

SHORT TRAINING PROGRAM

Application Form

2013-2014

Applications are invited from citizens of one of the following countries : ALBANIA, BELGIUM, BULGARIA, CANADA, CROATIA, CZECH REPUBLIC, DENMARK, ESTONIA, FRANCE, GERMANY, GREECE, HUNGARY, ICELAND, ITALY, LATVIA, LITHUANIA, LUXEMBOURG, THE NETHERLANDS, NORWAY, POLAND, PORTUGAL, ROMANIA, SLOVAKIA, SLOVENIA, SPAIN, TURKEY, UNITED KINGDOM and USA (with restrictions indicated under point 12)

(Please PRINT)

Family name :

First name :

Date and place of birth :

Address :

Please attach photograph here

Phone and :
fax numbers :
e-mail :

University name :
and Dept name :
Phone and :
fax numbers :
e-mail address :

Nationality a) at birth :
b) now :

Names and addresses of two professors who have agreed to provide recommendations :

1.

2.

Your answers to the following questions will aid us in selecting a program, which will best meet your requirements.

1. The objective of this program is to acquaint undergraduate students with fluid dynamic facilities, experimental and numerical techniques, and a methodology of research. This is accomplished by allowing students to participate in a current research project. Please examine the enclosed list of CURRENT RESEARCH ACTIVITIES at VKI and place a number from 1 to 5 in front of the five most interesting projects. Number 1 should indicate your first preference, number 2 the second, etc.

2. Indicate briefly your background in fluid dynamics, applied mathematics, FORTRAN and C programming, operating systems (e.g. UNIX, LINUX, Windows).

3. Will a training program at VKI also be used to satisfy a requirement at your university ?

4. Do you intend to use your research conducted at VKI for the preparation of a graduation thesis at your university ? (note : this is perfectly acceptable, we just wish to be informed)

5. Are you interested primarily in numerical or experimental work during your stay at VKI ?

6. Indicate the approximate period of time you wish to be at VKI; for example, 3 February – 27 March. List more than one period, if possible, with order of preference. The minimum period is two-three months; longer periods are possible.

7. Do you have a working knowledge of French and/or English ?

8. In which year of university studies are you currently registered ? e.g., 4^{th} year of 5 year program; 2^{nd} year of 3 year program, etc.

9. When do you expect to receive the university degree ? Which degree ? e.g. Dipl.Ing., B.S., M.S., Ing.Civ., etc.

10. What are your plans after you leave the university ? Further advanced study, research, industrial work, etc. ?

11. If you need financial assistance (i.e. fellowship) to attend this program, you should initiate contacts with potential fellowship sources in your country as soon as possible. Please indicate here below the names of the organizations to which you apply :

12. A limited number of VKI fellowships is available. In case you are unable to get an external support, will you require a VKI fellowship to attend this program ? (Please note that no VKI fellowship is available for citizens of Canada, Denmark, the Netherlands, Poland, the United Kingdom and U.S.A.).

13. In case the VKI cannot offer you a fellowship, do you still wish to be considered for this program ?

Please return the questionnaire, preferably before 1 April 2014 to :

Registration Office,
von Karman Institute, chaussée de Waterloo 72,
1640 Rhode-Saint-Genèse, Belgium.

Date : Signature :

von KARMAN INSTITUTE FOR FLUID DYNAMICS

INFORMATION FORM
FOR STUDENTS AT EUROPEAN OR AMERICAN UNIVERSITY
PREPARING THEIR GRADUATION THESIS AT THE VKI

Family name : ……

First name : ……

Home address : ……

……

Telephone number : ……

E-mail address : ……

University/School : ……

Requested period of residence at the VKI: from …… to ……

Subject of the thesis to be carried out at VKI (if available) : ……

……..……..

……

Expected date of submission of your thesis to your home University : ……

Name, Department and e-mail address of Supervisor at the University : ……

…… ……

……

Name Supervisor at VKI (if available) : ……..

VKI Department in which the research is to be carried out :

Aeronautics/Aerospace
Environmental and Applied Fluid Dynamics
Turbomachinery and Propulsion

Name of diploma expected at the University : ……

When do you expect to receive the diploma? : ……..……

I understand that the von Karman Institute reserves the right to publish the results obtained, with acknowledgement to the author and to his or her supervisor, in the Institute's technical notes or other publications.

Prior to my thesis defense, I will give two printed copies of my thesis, in their final form, to the VKI library.

……. ……..
Date Signature of Student

von Karman Institute for Fluid Dynamics

SHORT TRAINING PROGRAM

Active Research Topics

2013-2014

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

SHORT TRAINING PROGRAM

Letter of Recommendation

2013-2014

Mr., Mrs. Miss has requested you to provide a recommendation which will aid us in determining his or her suitability for a training period at the von Karman Institute and the possibility of offering the candidate a scholarship.

1. How long have you known the candidate ?

2. Does the candidate exhibit an aptitude and interest for advanced study in fluid mechanics ?

3. Please rank the candidate in academic performance with other students of yours :

Excellent		Average
⇓	⇓	⇓
(upper 10%)	(upper 25%)	(upper 50%)

4. Additional remarks ?

Your name : .....

University : .....

Phone and fax numbers : .....

E-mail address : .....….

Date and signature : .....

Thank you for your cooperation. Please fax (32 2 359 96 00) and post this form as soon as possible to :

Registration Office,
von Karman Institute, chaussée de Waterloo 72,
1640 Rhode-Saint-Genèse, Belgium.

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