

- ❑ INTRODUCTION TO MEASUREMENT TECHNIQUES
OCTOBER 8-12, 2012
- ❑ INTRODUCTION TO CFD
JANUARY 21-25, 2013
- ☑ CUBESAT TECHNOLOGY AND APPLICATIONS
JANUARY 29 - FEBRUARY 1, 2013
- ❑ CFD FOR ATMOSPHERIC FLOW AND WIND ENGINEERING
MARCH 11-13, 2013
- ❑ RADIAL COMPRESSOR DESIGN
MARCH 11-15, 2013
- ❑ ACCURATE AND EFFICIENT AEROACOUSTIC PREDICTION APPROACHES FOR AIRFRAME NOISE
MARCH 25-28, 2013
- ❑ AEROENGINE DESIGN: FROM STATE OF THE ART TURBOFANS TOWARDS INNOVATIVE ARCHITECTURES
APRIL 8-12, 2013
- ❑ FLUID DYNAMICS ASSOCIATED TO LAUNCHER DEVELOPERS (STO-AVT-VKI)
APRIL 15-19, 2013
- ❑ RADIATION AND GAS-SURFACE INTERACTION PHENOMENA IN HIGH SPEED RE-ENTRY (STO-AVT-VKI)
MAY 6-8, 2013
- ❑ TURBULENT COMBUSTION
MAY 13-17, 2013
- ❑ SOURCE TERM CHARACTERIZATION OF THE CONSEQUENCES OF STORAGE TANK AGGRESSIONS (STO-AVT-VKI)
JUNE 3-5, 2013
- ❑ TRANSITION AND TURBULENCE IN HIGH-SPEED FLOW
JUNE 10-14, 2013
- ❑ FLOW CHARACTERISTICS AND PERFORMANCE OF SAFETY VALVES
SEPTEMBER 9-11, 2013
- ❑ ACCURATE TEMPERATURE MEASUREMENTS
SEPTEMBER 16-20, 2013
- ❑ 37TH COMPUTATIONAL FLUID DYNAMICS: ADJOINT METHODS IN CFD
TO BE DETERMINED

THE VON KARMAN INSTITUTE

VKI is a non-profit international educational and scientific organisation, hosting three departments (aeronautics and aerospace, environmental and applied fluid dynamics, and turbomachinery & propulsion). It provides post-graduate education in fluid dynamics (research master in fluid dynamics, former "VKI Diploma Course", doctoral program, short training program and lecture series) and encourages "training in research through research". The von Karman Institute undertakes and promotes research in the field of fluid dynamics.

It possesses about fifty different wind tunnels, turbomachinery and other specialized test facilities, some of which are unique or the largest in the world. Extensive research on experimental, computational and theoretical aspects of gas and liquid flows is carried out at the VKI under the direction of the faculty and research engineers, sponsored mainly by governmental and international agencies as well as industries.

The von Karman Institute organizes each year 8 to 12 one-week Lecture Series on specialized topics in the field of aerodynamics, fluid mechanics and heat transfer with application to aeronautics, space, turbomachinery, the environment and industrial fluid dynamics. These courses have gained over the years world wide recognition for their high quality which is the result of a careful choice of subjects of current interest and lecturers known for their excellency in that field and willing to co-operate in building up well-structured courses.

von Karman Institute for Fluid Dynamics
Waterloossteenweg 72
1640 Sint-Genesius-Rode, Belgium

Phone: +32(0)2 359 96 04
Fax: +32(0)2 359 96 00
E-mail: secretariat@vki.ac.be,

Website: <https://www.vki.ac.be>

TVA BE 0407 185 709



follow us on
twitter

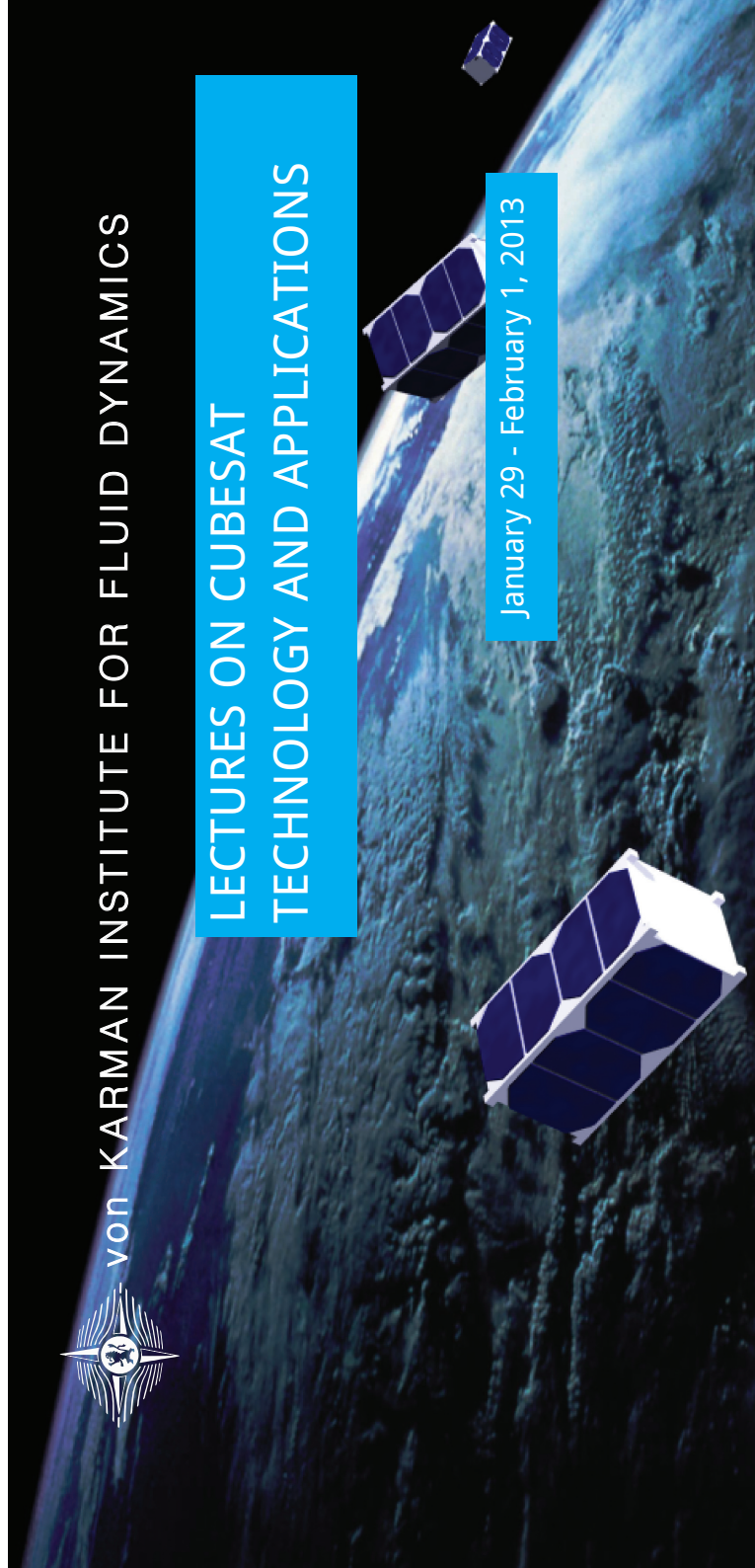
twitter.com/vki_vonkarman



VON KARMAN INSTITUTE FOR FLUID DYNAMICS

LECTURES ON CUBESAT
TECHNOLOGY AND APPLICATIONS

January 29 - February 1, 2013



INTRODUCTION

A CubeSat is a fully functional small satellite of cubical shape. It comes in three sizes: a 1U (or single) CubeSat is 10x10x10 cm³ in size and weighs 1 kg, a 2U (or double) CubeSat is 10x10x20 cm³ in size and weighs 2 kg, and a 3U (or triple) CubeSat is 10x10x30 cm³ in size and weighs 3 kg. Even a 1U CubeSat can carry a miniaturised science sensor or a camera for Earth observations or a technological experiment in addition to all the standard subsystems required for a satellite.

The CubeSat standard was proposed in 1999 by Stanford University and Cal Poly. The first six CubeSats were launched in 2003. Since then, about 250 CubeSats have been launched or are under development or in various planning stages. Most CubeSats are developed and operated by students for educational purposes under the guidance of an experienced tutor. Industry is increasingly making use of these low-cost satellites to test new technologies in space.

During launch, the CubeSats are accommodated in standardised containers from which they are deployed once they are in orbit. Nowadays, space-qualified CubeSat structures and all subsystems can be purchased from specialised small companies. Alternatively, all or some subsystems can be built by students, which is less expensive and maximises the educational benefit but requires more expertise and time.

The lectures on "CubeSat Technology and Applications" will address all fields of CubeSat design and development, environmental testing, launch, operations, legal aspects, the potential of CubeSat networks and will provide an overview of scientific and technological experiments.

The lectures will present an ideal preparation for the worldwide CubeSat teams to learn the essentials of CubeSat technology and a good opportunity for meeting researchers from other CubeSat teams. Ample time will be provided for asking questions. The lectures are also open to students from teams pursuing CubeSat projects and to young professionals from industry or space agencies wishing to learn more about CubeSats. All participants will receive the lecture notes. As attendance is limited to 100 participants it is recommended to register early.

VKI is the lead institute of a Consortium of 15 European, American and Asian institutes that is now in the process of realising the first ever CubeSat network in orbit. This is the QB50 Project which involves 40 double CubeSats carrying sensors for in-situ measurements in the largely unexplored lower thermosphere and the F layer of the ionosphere and 10 double and triple CubeSats for demonstration of newly developed science instruments and innovative technologies. QB50 is a fully funded EU Project with participation from 50 universities in 39 countries. QB50 will be launched in 2015 into a nearly circular orbit at 320-350 km altitude.

The Lecture Directors are Ruedeger Reinhard and Cem O. Asma.



VON KARMAN INSTITUTE FOR
FLUID DYNAMICS

COURSE FEE

To encourage greater participation to the Lectures on CubeSat Technology and Applications, an exceptionally reduced fee is offered by VKI thanks to sponsoring organizations. The attendance fee for professionals is **750 Euros**.

The reduced fee is **250 Euros** for undergraduate and graduate students who are in possession of a recommendation letter from his or her professor.

Exhibits by commercial companies are possible for a fee of 1000 Euros. The interested companies should contact Cem O. Asma by sending an email to asma@vki.ac.be.

The participation fee includes lecture notes, lectures, coffee breaks, lunches and a reception.

ONLINE REGISTRATION AVAILABLE

<https://www.vki.ac.be/registration>

It is highly recommended that the registration is sent at the latest 15 days before the beginning of the course. A letter of acceptance and additional information will be sent on receipt of the application form.

SCHEDULE

Tuesday 29 January 2013

- 15:30 Registration
- 16:30 Overview of CubeSat technology and CubeSat missions
Dr. R. Reinhard, von Karman Institute, Belgium
- 17:30 Science sensors/instruments for in-situ measurements
Dr. D. Kataria, University College London, UK

Wednesday 30 January 2013

- 09:00 Science sensors/instruments for remote-sensing observations
Dr. J. De Keyser, Belgian Institute for Space Aeronomy, Belgium
- 10:00 Coffee Break
- 10:30 Technology demonstration on CubeSats I
Mr. C. Clark, Clyde Space, Scotland, United Kingdom
- 11:30 Technology demonstration on CubeSats II
Prof. V. Lappas, Surrey Space Centre, United Kingdom
- 12:30 Lunch Break
- 14:00 Electrical Power Subsystem
Mr. C. Clark, Clyde Space, Scotland, United Kingdom
- 15:00 Coffee Break

- 15:30 Attitude determination and control
Prof. V. Lappas, Surrey Space Centre, United Kingdom
- 16:30 Telecommunications
G. Shirville, AMSAT-UK, United Kingdom
- 17:30 Reception

Thursday 31 January 2013

- 9:00 Orbital dynamics and lifetimes of CubeSats in orbit
Dr. E. Doornbos, TU Delft, The Netherlands
- 10:00 Coffee Break
- 10:30 On-Board Data Handling
Prof. J. Dalsgaard Nielsen, Aalborg University, Denmark
- 11:30 CubeSat design and architecture
Prof. J. Dalsgaard Nielsen, Aalborg University, Denmark
- 12:30 Lunch Break
- 14:00 Ground stations, ground station networks, frequency allocation
Mr. G. Shirville, AMSAT-UK, United Kingdom
- 15:00 Coffee Break
- 15:30 Micropropulsion systems
Mr. B. Zandbergen, TU Delft, The Netherlands

- 16:30 Formation flying: Theory, System, Application
Prof. E. Gill, TU Delft, The Netherlands

Friday 1 February 2013

- 09:00 CubeSat constellations, swarms, networks
Dr. R. Reinhard, von Karman Institute, Belgium
- 10:00 Coffee Break
- 10:30 Future technologies on CubeSats
Prof. V. Lappas, Surrey Space Centre, United Kingdom
- 11:30 Deployers and deployment systems
Prof. R. Aslan, Istanbul Technical University, Turkey
- 12:30 Lunch Break
- 14:00 Environmental testing requirements and facilities
Prof. R. Aslan, Istanbul Technical University, Turkey
- 15:00 Coffee Break
- 15:30 Launch vehicles suitable for launching CubeSats
Mr. A. Bonnema, Innovative Solutions in Space, The Netherlands
- 16:30 CubeSat legislation and regulations
Asst. Prof. T. Masson-Zwaan, Leiden University, The Netherlands