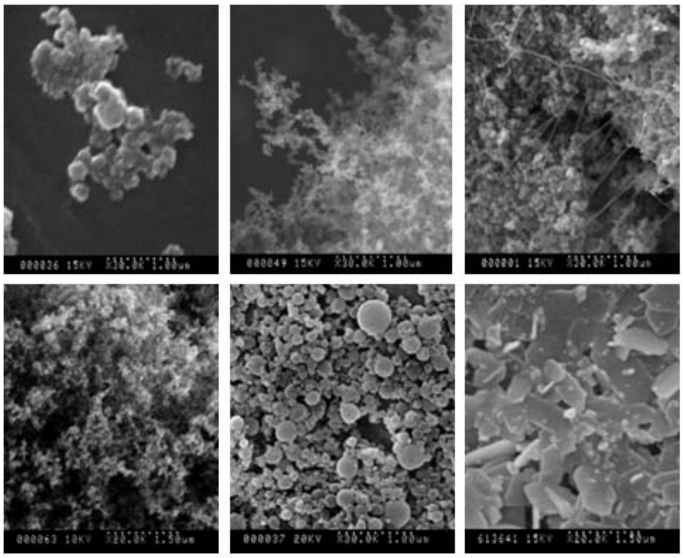
Please correct your address if necessary)

Lecture Series Secretary
von Karman Institute for Fluid Dynamics
72 Chaussée de Waterloo
B-1640 Rhode-St-Genèse
Belgium

von KARMAN INSTITUTE
FOR FLUID DYNAMICS

MODELING AND COMPUTATION OF NANOPARTICLES IN FLUID FLOWS



February 9-12, 2009

In collaboration with the RTO

NATO RESEARCH AND
TECHNOLOGY ORGANIZATION

von Karman Institute for Fluid Dynamics
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1640 Rhode-Saint-Genèse, Belgium

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INTRODUCTION

This Lecture Series is especially dedicated to the numerous topics arising when researchers have to predict numerically the behaviour of nanoparticles in a fluid. Beside an isolated nano object, the keyword of nanoparticle has to be understood more generally as including also agglomerate of nano-particles, of nano-tubes and/or related complex structures.

As a matter of fact, numerous questions arise when the path of such objects have to be predicted. Already concerning the methods and the tools, what is the best alternative if the relative size of the particle compare to the local molecular mean free path forbids the use of a Navier-Stokes approach?

For this last approach, what are the drag coefficients to be used for the tracking of agglomerate of nano-particles/tubes? How are treated the interactions with walls and what are the forces to be taken into account? What is the state of the art concerning the Brownian forces? What are the turbulent scales to be taken into account? How nanoparticles are treated through a shock or in a fluid flowing quicker than the local speed of sound. All these questions will be debated by a panel of selected lecturers.

During the LS period, time will also be devoted to present experimental results that present a challenge to understand such as the effect of nanoparticle on surface tension, on heat transfer and in general on the properties of the bulk phase.

The Director of this Lecture Series are Prof. Patrick Rambaud and Prof. O. Chazot, von Karman Institute for Fluid Dynamics, Belgium and Prof. P. Proulx, Université de Sherbrooke, Canada.

TIMETABLE

MONDAY FEBRUARY 9

08:45 Registration
09:15 Welcome address and introduction
11:00 Lagrangian versus Eulerian method for nanoparticles
G. Ahmadi, Clarkson University, USA
14:00 Modeling particle distribution and the QMOM type approach
M. Frenklach, University of California, USA
15:45 Plasma flow synthesis
P. Proulx, Université de Sherbrooke, Canada
17:00 Reception

TUESDAY FEBRUARY 10

09:00 Eulerian multi-fluid models: modelling and numerical methods I
M. Massot, CNRS, France
11:00 Modeling particle aggregation
M. Frenklach
14:00 Transport, deposition, and removal of charged nanoparticles
G. Ahmadi
15:45 Eulerian multi-fluid models: modeling and numerical methods II
M. Massot

WEDNESDAY FEBRUARY 11

09:00 Modeling nanoparticle formation
M. Frenklach
10:45 Aspects of hydrodynamics of nano and microparticles
W. Peukert, University of Erlangen-Nürnberg, Germany
14:00 Modeling interaction between electric field and nanoparticles I
P. Sheng, University of Sciences and Technology, Hong Kong
15:45 Adhesion of particles
W. Peukert

THURSDAY FEBRUARY 12

09:00 Stochastic particle method and sintering
M. Kraft, University of Cambridge, United Kingdom
10:45 Modeling interaction between electric field and nanoparticles II
P. Sheng, University of Sciences and Technology, Hong Kong
14:00 Modeling soot formation
M. Kraft
15:45 Concluding remarks
17:00 VKI bus departure

PRACTICAL INFORMATION

Lunch will be taken from 12h30 to 14h00. Coffee breaks are scheduled each morning and afternoon.

Please pass this announcement to someone who may be interested if you are unable to attend the Lecture Series yourself

VON KARMAN INSTITUTE FOR FLUID DYNAMICS

ACCOMMODATION & TRANSPORT

Participants are advised to make their reservations as early as possible. VKI secretariat (secretariat@vki.ac.be) can book rooms upon request in the recommended hotels listed below. Daily rates include all charges and continental breakfast. These prices could be subject to changes. **However, participants could occasionally find special offers on hotel websites.**

Hôtel des Colonies
http://www.hotel-des-colonies.com Single: 120 € / Double: 140 €

Hôtel Vendôme
http://www.hotel-vendome.be see the website

Hôtel Marivaux
http://www.marivaux.be see the website

Thon Hotel Brussels City Centre
http://www.thonhotels.be/ Single: 142 € / Double: 174 €

Hôtel Le Dôme
http://www.hotel-le-dome.be Single: 125 € / Double: 145 €

Progress Hôtel
http://www.progresshotel.be Single: 200 € / Double: 220 €

A youth hostel, the Sleepwell, is within walking distance of the recommended hotels. We invite you to make your own reservation through their website: http://www.sleepwell.be.

The hotels situated in Brussels are all within walking distance from the Place Rogier. A train service links the airport with the Gare du Midi. Complete your journey to the hotel/youth hostel by taxi. Each morning and evening, bus transport will be provided between the Place Rogier and the von Karman Institute, located in Rhode-Saint-Genèse, a suburb south of Brussels.

The following hotels are also recommended, particularly for those who travel by private car.

Auberge de Waterloo****
Chaussée de Waterloo 212 - 1640 Rhode-Saint-Genèse
Tel: +32 (0)2 358 35 80 - Fax : +32 (0)2 358 38 06
http://www.aubergedewaterloo.be
(*1single room: +/- 106€*)

Gravenhof Hotel
Alsembergsesteenweg 616 - B-1653 Dworp
Tel: +32 2 380 44 99 - Fax: +32 2 380 40 60
http://www.gravenhof.be
(*1 single room: +/- 105 €, breakfast not included*)

For more information about the location of the Institute and the hotels, please visit our website on http://www.vki.ac.be.

APPLICATION FOR ADMISSION TO VKI LECTURE SERIES

Lecture Series Title: MODELING AND COMPUTATION OF NANOPARTICLES IN FLUID FLOWS (RTO-AVT-VKI LECTURE SERIES).....

☐ Mr ☐ Mrs

Family name: .....Firstname: .....

Name & full address of organisation, institution or university: .....

Phone nr: .....Fax nr: .....

Position or title: .....E-mail: .....

☐ Asking a reduced fee and joining a recommendation letter as: ☐ undergraduate student ☐ Ph.D. candidate or University assistant

Company / University VAT number: .....

VAT of the von Karman Institute: BE 0407 185 709

HOTEL RESERVATION *(if applicable)*

I require accommodation at Hotel .....for .....person(s)

Single: .....Double: .....Date of arrival: .....

I shall require transport to and from the Institute ☐ Date of departure: .....

I do not require transport to and from the Institute ☐

Please indicate any special needs (e.g. vegetarian, ..):

.....

Date: .....Signature: .....

Please mail under -cover to VKI

Programme

LECTURE SERIES
2008-2009

VKI LS

- ☐ INTRODUCTION TO CFD
  (12-16 January 2009)
- ☐ ADVANCES IN LAMINAR-TURBULENT TRANSITION MODELING
  (12-15 January 2009 - at the Wright State University, Ohio, USA)
- ☐ RECENT ADVANCES IN PARTICLE IMAGE VELOCIMETRY
  (26-30 January 2009)
- ☑ MODELING AND COMPUTATION OF NANOPARTICLES IN FLUID FLOWS (RTO-AVT-VKI)
  (9-12 February 2009)
- ☐ FLOW CONTROL: FUNDAMENTALS, ADVANCES AND APPLICATIONS
  (2-6 March 2009)
- ☐ AERODYNAMIC NOISE FROM WALL-BOUNDED FLOWS
  (9-13 March 2009)
- ☐ LIQUID FRAGMENTATION IN HIGH-SPEED FLOW
  (16-18 March 2009)
- ☐ NUMERICAL INVESTIGATIONS IN TURBOMACHINERY: THE STATE OF THE ART
  (20-24 april 2009)
- ☐ HIGH PERFORMANCE COMPUTING OF INDUSTRIAL FLOWS
  (5-7 May 2009)
- ☐ ADVANCED HIGH TEMPERATURE INSTRUMENTATION FOR GAS TURBINE APPLICATIONS
  (11-14 May 2009)
- ☐ TURBULENT COMBUSTION
  (25-29 May 2009)
- ☐ 36TH CFD.ADIGMA COURSE ON VERY HIGH ORDER DISCRETIZATION METHODS
  (June 8-12, 2009)

OTHER CONFERENCES:

- ☐ PHYSMOD 2009: INTERNATIONAL WORKSHOP ON PHYSICAL MODELLING OF FLOW AND DISPERSION PHENOMENA
  (24-26 August 2009)
- ☐ 4TH SYMPOSIUM ON INTEGRATION CFD AND EXPERIMENTS IN AERODYNAMICS
  (14-16 September 2009)

COURSE FEE

The course fee of 890 € includes printed notes, transport between VKI and the recommended hotels, lunches, beverages, and administrative costs. The prices include VAT (21%).

This Lecture Series is sponsored by Technofutur Industrie and Technifutur in the frame of the Plan Marshall's project: Nanowall. Free inscriptions are offered for any person (worker, student, professor) leaving in Wallonie or company having its Head-Quarter in Wallonie. Due to the limited amount of free inscriptions, positive answer will be given only to the first applicants.

FELLOWSHIPS

To encourage greater participation in our Lecture Series programme by university members, the Institute has established a limited number of VKI Lecture Series fellowships for citizens of NATO countries contributing to the financing of the VKI, as well as for citizens of other NATO countries coming from a university in a VKI financing country. The recipient of a fellowship is entitled to attend the VKI Lecture Series at a reduced fee, which will be 595 € (VAT included) for assistants not having a Ph.D. degree and for Ph.D. candidates, or 295 € (VAT included) for undergraduate students. The request to be considered for an award must accompany the application to attend the Lecture Series, and the applicant must provide a recommendation letter from his or her professor; if not done so, the request will not be taken into consideration. All possible alternative sources of funding should be investigated before aid is requested under this scheme, so that those most in need will benefit.

METHODS OF PAYMENT

Payment 2 weeks prior to the beginning of the course (name and course title clearly indicated) by bank transfer to our account Nr 210-0315330-35 at Fortis Bank, avenue de la Forêt de Soignes 322, 1640 Rhode-Saint-Genèse, Belgium, IBAN BE57 2100 3153 3035 (strongly recommended). SWIFT BIC GEBABEBB.

Late registration can be paid in cash (EURO), or by VISA or Eurocard at the beginning of the course.

PROCEEDINGS

Lectures will be given in English and printed notes will be distributed during registration. Proceedings of other non-RTO lecture series may be purchased at VKI (by e-mail: vanhaelen@vki.ac.be or by fax : 32 2 359 96 00). Information can be found on http://www.vki.ac.be.

HOW TO REGISTER

It is highly recommended that the registration/hotel reservation form 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.