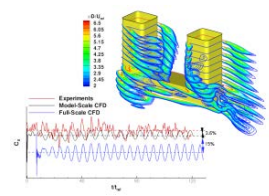
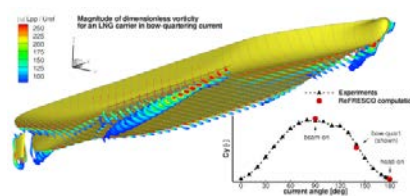
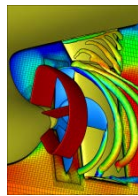
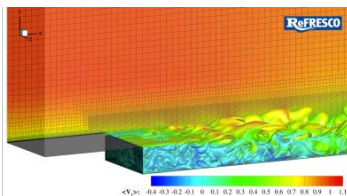


Course 2016

Computational Fluid Dynamics (CFD) for maritime applications



This course has been designed to reflect the latest experience in the application of Computational Fluid Dynamics (CFD) for ship design, offshore engineering and renewable energy applications. To obtain reliable and accurate CFD results for these applications, application-specific choices and 'best practice' will be presented.

It provides a general introduction on theoretical fluid-dynamics and CFD topics, followed by specific maritime applications of CFD, such as for ship resistance and performance, cavitation and pressure pulses, Energy Saving Devices (ESDs), Anti Roll Tanks (ART), manoeuvring, current and wind loads, VIM & VIV, wave impacts, motions of floating structures. Attention will be given to boundary conditions, calculation setup and numerical settings, geometry manipulation, quality aspects and difficulties in grid generation, calculation control & post-processing and verification and validation. Emerging techniques in CFD and coupling of CFD with other tools will be addressed as well. Each day will be concluded with practical CFD exercises.

All topics addressed in this course are relevant for the use of any state-of-the-art viscous-flow CFD code and insight into the validity of your CFD results. The team of teachers and instructors consists of MARIN specialists in the relevant fields.

This course is intended for both existing professional staff and newcomers in the maritime industry. Participants should have at least a Masters degree (MSc.) in naval architecture, ocean engineering, equivalent education or experience.

When: November 14 – 17 (4 days) 2016
Where: MARIN, Wageningen, The Netherlands
Costs: € 3.200,00 (including lunches, drinks and course dinner on Thursday)

Hotel option: Hof van Wageningen
www.hofvanwageningen.nl
 approx. € 75,00 per night including breakfast
Hotel option: De Wageningsche Berg
www.hoteldewageningseberg.nl
 approx. € 100,00 per night including breakfast

Registration: www.marin.nl/courses

Registration deadline: October 13, 2016

For more information please contact courses@marin.nl

For conditions see page 2.

CONDITIONS

VENUE

The course will be held at MARIN, Haagsteeg 2, Wageningen, The Netherlands or nearby MARIN (5 minutes walk from MARIN).

ACCOMMODATION

Hotel accommodation is not included in the course fee. However, MARIN intends to make reservations at a special course rate. Hotel Hof van Wageningen is 10 minutes walk from MARIN. Hotel Wageningsche Berg is 20 minutes by bike or 10 minutes by taxi or car (transfers are not included in the course fee).

DOCUMENTATION

The course notes contain the full set of information as presented during the course. The course notes will be made available on paper. Strict copyrights apply to the course notes and they shall not be made available or sold to other parties.

English will be the official language for all communication and documentation.

NUMBER OF PARTICIPANTS, GROUP REDUCTION

The course is subject to a minimum number of participants (12) and a maximum (25). Admittance to the course will be on first come first served basis. The following group reduction is valid:

No. Participants	Reduction	Price	Reduced price
1	0%	€ 3,200.00	€ 3,200.00
2	0%	€ 6,400.00	€ 6,400.00
3	10%	€ 9,600.00	€ 8,640.00
4	10%	€ 12,800.00	€ 11,520.00
5	20%	€ 16,000.00	€ 12,800.00
6	20%	€ 19,200.00	€ 15,360.00

PAYMENT

Fee to be paid upon receipt of invoice with a deadline of at least two weeks prior to the first day of the course. Payment by cheque or international money order, made payable to: MARIN, The Netherlands; Account number 53 93 39 156, IBAN number NL77ABNA0539339156 ABN-AMRO Bank N.V., Amsterdam.

CANCELLATION

In case of a cancellation by the participant, the following rules apply:

- Cancellation within 2 weeks of the start of the course: 100% of the course fee.
- Cancellation within 1 month of the start of the course: 30% of the course fee.
- In other cases the cancellation is free of charge.

In case that MARIN is forced to cancel a course due to a lack of participation, we will inform the registered participants on the first working day after the Application/registration deadline. In this case the entire fee will be refunded.

APPLICATION

To ensure your participation (number of participants is limited), please fill in the registration form on www.marin.nl/courses.

Application deadline: Thursday, October 13, 2016

Tentative course program "Computational Fluid Dynamics (CFD) for maritime applications"

Time	MONDAY 14 November	TUESDAY 15 November	WEDNESDAY 16 November	THURSDAY 17 November
	General introduction CFD	CFD for maritime applications	CFD for offshore engineering	Advanced CFD topics
8:45	Course kick-off 8:45 - 9:00	Coffee 8:45 - 9:00	Coffee 8:45 - 9:00	Coffee 8:45 - 9:00
9:00	Topics: - General introduction - Introduction into fluid dynamic equations	Topics: - Applications for resistance - Propulsion (total system, ship resistance, steady free surface)	Topics: - Application for steady-state (current loads, wind loads, thruster-interaction) 9:00 - 9:45	Topics: - Emerging CFD techniques - Fluid-structure interaction - Coupled applications - Acoustics - Parallelisation/HPC
9:15				
9:30				
9:45	Coffee break 9:45 - 10:00	Coffee break 9:45 - 10:00	Coffee break 9:45 - 10:00	Coffee break 9:45 - 10:00
10:00	Topics: continuation of topics above	Topics: continuation of topics above	Topics: continuation of topics above	Topics: continuation of topics above
10:15				
10:30				
10:45				
11:00				
11:15	Questions 11:15 - 11:30	Questions 11:15 - 11:30	Questions 11:15 - 11:30	Questions 11:15 - 11:30
11:30	Lunch 11:30 - 12:30	Lunch 11:30 - 12:30	Lunch 11:30 - 12:30	Lunch 11:30 - 12:30
11:45				
12:00				
12:15				
12:30				
12:45	Topics: - Computational fluid dynamic methods - Turbulence mathematical approaches - Verification/Validation	Topics: - Applications for propulsors (actuator disk, frozen rotor, RANS/BEM, sliding interface, cavitation and pressure pulses, ESD)	Topic: - Applications for moving structures (VIM, VIV, Roll)	Tour around MARIN facilities
13:00				
13:15				
13:30	Coffee break 13:30 - 13:45	Coffee break 13:30 - 13:45	Coffee break 13:30 - 13:45	
13:45	Topics: continuation of topics above	Topics: continuation of topics above	Topics: continuation of topics above	
14:00				
14:15				
14:30	Questions 14:30 - 14:45	Questions 14:30 - 14:45	Questions 14:30 - 14:45	Closing session (drinks & certificates) 14:00 - 15:00
14:45	Topics: - Maritime application specifics I (free-surface, waves, cavitation) - Maritime application specifics II (motions, grid adaption methods)	Topics: - Application for manoeuvring & seakeeping (CFD based manoeuvring models, ART, moonpools, roll damping)	Topic: - Applications for free-surface (green water, impacts, waves, moonpools)	
15:00				
15:15				
15:30	Coffee break 15:45 - 16:00	Coffee break 15:45 - 16:00	Coffee break 15:45 - 16:00	
15:45				
16:00				
16:15	Topics: continuation of topics above	Topics: continuation of topics above	Topics: continuation of topics above	
16:30				
16:45				
17:00				
17:15	Topic: Practical exercise V&V	Topic: Practical exercise	Topic: Practical exercise	
17:30				
17:45				
18:00				
18:15				
18:30	Welcome drinks Cafe in Wageningen 19:00 - 20:00		Dinner Restaurant in Wageningen 19:00 - 23:00	
18:45				
19:00				
20:00				