Introduction to Multiphase Flow Metering

Location: Christian Michelsen Research AS, Fantoftvegen 38, Bergen (NORWAY)

Next courses:
- April 9-11, 2013
- August 27-29, 2013
- November 26-28, 2013
Multiphase Flow Metering

**Key words:** Practical introduction to the basics of multiphase flow measurements incl. the presentation of three specific multiphase flow meters. Some of the content is based upon NFOGM’s handbook in multiphase metering.

**Learning goals:** Basic knowledge and understanding of multiphase metering and selected multiphase metering technologies.

**Learning techniques:** The training sessions consist of lectures as well as discussions based on the participants’ own experiences and needs. Interactive exercises and demonstrations in Christian Michelsen Research's flow loop facility will also be an integrated part.

**Target group:** Instrumentation or measurement technicians, process engineers, or other technical staff, personnel in service- or supply companies, managers or others who need intermediate-level understanding of and insight in multiphase metering.

**Prerequisites:** 2-5 years of experience with flow metering.

**Main instructor:** Department Manager Marie Bueie Holstad PhD (CMR)

**Price H1 2013:** NOK 16 400 (exclusive VAT) including lunch and refreshments

**Price H2 2013:** NOK 20 300 (exclusive VAT) including lunch and refreshments

**Location:** CMR, Fantoftvegen 38, Bergen (NORWAY)

**Time:** See front page

**Cancellation deadline:** 1 month prior to course start

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**Inquiries and Registration**

Email:  [training@cmr.no](mailto:training@cmr.no)
Phone:  +47 55 57 40 40
Mail:  The Michelsen Centre, P.O. Box 6031, NO-5892 Bergen, NORWAY

Website:  [www.michelsencentre.no/flowmeasurement](http://www.michelsencentre.no/flowmeasurement)

We will need your **name, phone, email, and billing address** in order to complete your registration.

**Cancellation policy**

A minimum of ten participants is required per course. You may withdraw from a course up to the cancellation date without cost. Substitutions are accepted when notification is given in advance.

A fee of 25% of the course fee will be charged per cancellation received after the cancellation deadline. The courses may be modified or cancelled due to circumstances beyond the organisers’ control.

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**The Michelsen Centre**

The Michelsen Centre for Measurement Science and Technology (MIMT) [www.michelsencentre.no](http://www.michelsencentre.no) was granted status as a Centre of Research-Based Innovation by the Research Council of Norway in 2006 and is hosted by Christian Michelsen Research AS (CMR) in Bergen (NORWAY).

MIMT has currently 3 research partners (CMR, University of Bergen, and Bergen University College) and 8 industry partners (AADI, Archer, CGGVeritas, FMC Metering, MMC Tendos, Proanalysis, Roxar, Statoil).
Day 1 (09:00-16:30)

- Registration and coffee
- Welcome and introduction
- Background on flow metering
- Multiphase flows, fluid properties and PVT effects
- Multiphase metering technologies and categories
- Multiphase metering concepts
- Multiphase metering technologies: Phase velocities and volume flow
- Multiphase metering technologies: Electromagnetism

Day 2 (08:30-17:00)

- Multiphase metering technologies: Gamma ray methods
- Three examples of topside technology solutions
- Workshop: Exercises
- Demonstration in CMR multiphase flow loop facility.

Day 3 (08:30-15:30)

- Performance specification and design of MPFM installations
- Testing, calibration and adjustment
- Installation, commissioning and verification
- Topside, subsea and downhole applications
- Wrap-up: Summary, course diploma

CMR Instrumentation

CMR Instrumentation is a business unit of Christian Michelsen Research AS (CMR) [www.cmr.no](http://www.cmr.no) and represents more than three decades of continuous R&D work on advanced measurement solutions for liquid and gas measurements within the oil and gas industry. The research and development of advanced measurement technologies has enabled significant industrial product development, and the establishment of new business ventures within the oil and gas industry.

NFOGM

The Norwegian Society for Oil and Gas Measurement [www.nfogm.no](http://www.nfogm.no) is an independent society for personnel engaged in measurement of oil and gas in the Norwegian oil and gas business. The Society’s technical activities include flow measurement, sampling and online quality measurement in processing and transportation facilities. NFOGM has developed several handbooks within flow metering that provide guidance and recommendations to the industry. This includes the handbook that is part of the background for this course.
Our Instructors

**Kjetil Folgerø** (PhD) is Senior Scientist in the Department of Multiphase Metering at CMR. He has more than 12 years of experience in design of sensors and instrumentation based on electromagnetic technology and microwave circuitry. His main interest is permittivity measurement of petroleum fluids. He is a lecturer, and has authored more than 20 publications.

**Kjell-Eivind Frøysa** (PhD) is Manager of the Dept. for Fiscal Metering Oil & Gas at CMR and has more than 18 years of experience in this field. His main interests are fiscal metering, acoustic technologies for fiscal metering, and uncertainty calculations. He has authored more than 60 publications and participated in establishing 3 industry best practice handbooks.

**Anders Hallanger** (MSc) is a Senior Scientist at CMR, and has more than 10 years of experience in multiphase metering. His main interests are multiphase metering, flow simulation and flow modelling. He is also member of AIAA, has authored 19 publications and participated in establishing industry best practice handbooks on the subject.

**Magne Husebø** (BSc) has had various positions within the Oil & Gas sensor industry since 1988, including the position as Scandinavian Manager of O&G process instrument supplier Tracerco. Magne holds the position as Technology Director at CMR.

**Marie Bueie Holstad** (PhD) is Dept. Manager at CMR and has more than 6 years of experience in multiphase flow metering. One of her main interests are nucleonic measurement methods, in particular utilization of scattered and transmitted gamma rays. She has authored and co-authored more than 15 publications.