Report of the CCM Working Group on WGDV

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19th CCM meeting, 25-26 May 2023

CONSULTATIVE COMMITTEE
FOR MASS AND RELATED QUANTITIES

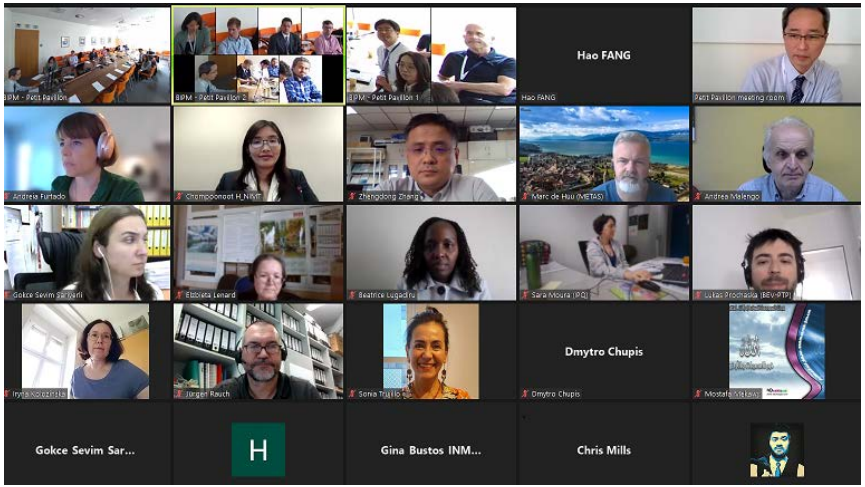
WG Meetings held since last CCM

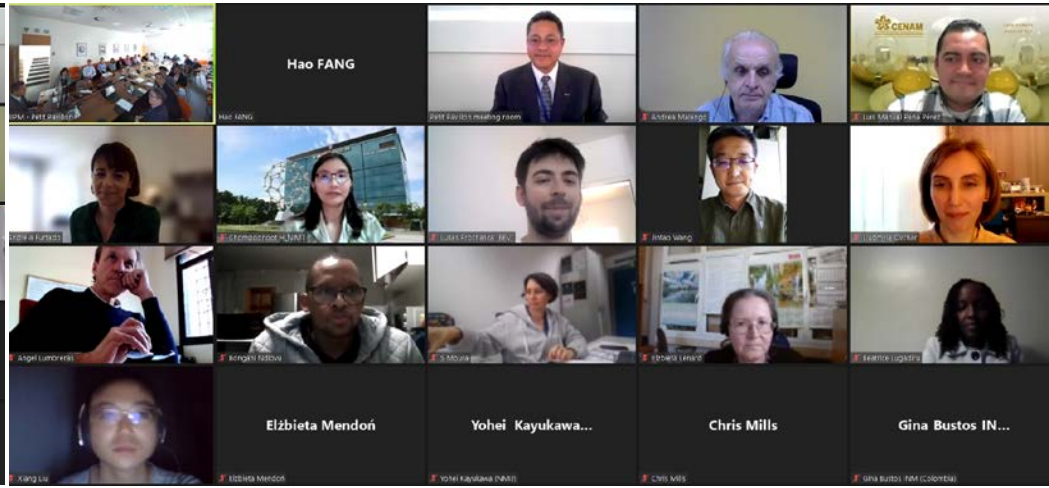
– May 23, 2023 at the BIPM

- 27 member institutes (NMIs and BIPM)

A*STAR, BEV, BIPM, CEM, CENAM, GUM, INMETRO, INRIM, IPQ, KRISS, LNE-CNAM, METAS, NIM, NIS, NIST, NMIA, NMIJ, NMISA, NPL, NPLI, NRC, PTB, SMU, SP, UME, VNIIM, VSL

- Number of participants (45 for density and 30 for viscosity)





WG Meetings planned

- In the week of the next CCM meeting at the BIPM

  For WGDV, it is difficult to hold a meeting at a conference nor other occasions because there are no conferences to gather in one place for the members of density and viscosity

Main actions taken and main achievements

- **Proceed planning for starting new KCs and pilot study**
  - CCM.D-K2.202X for density
  - CCM-V-K5 for viscosity
  - Pilot study of surface tension

- **Start reviewing and updating CMCs and service category**
  - Simplification and reduction of number of CMCs for viscosity and Addition of two services to service category for density was just proposed in WGDV meeting

Progressing the state of the art

- For the determination of the Planck constant to redefine the kilogram, the uncertainty of the density measurement of silicon spheres were significantly reduced by improving optical interferometers for the sphere volume measurement. It is expected that this would be reflected in the results of KC on density measurement of silicon spheres and also in the future evolution of a variety of density measurements based on silicon density standards.

Liaison & stakeholders

— Liaison

No specific organization except for NMIs and DIs with maintaining their CMCs

— Stakeholders

Industries of energy, alcohol and food

Manufacturers for measurement of their related materials

Producers for reference standards

KCs completed (Density)

- **CCM.D-K1 Density measurement of a silicon sphere by hydrostatic weighing (2001-2003)**

  Pilot: NMIJ, 8 participants

- **CCM.D-K2 Comparison of liquid density standards (2004-2005)**

  Pilot: PTB, 8 participants

- **CCM.D-K4 Hydrometer calibrations (2011-2012)**

  Pilot: INRIM, 9 participants

KCs underway (Density)

- **CCM.D-K1.2023 (Density measurement of a silicon sphere)**

  Pilot: PTB, 11 participants, Measurement in progress

- **CCM.D-K2.202X (Liquid density)**

  Pilot: not selected, 15 NMIs and DI are interested

- **CCM.D-K3 (Density measurements of stainless-steel weights)**

  Pilot: NMIJ, 15 participants, Protocol in progress

- **CCM.D-K4.202X (Hydrometer calibrations)**

  Planning not started

- **CCM.D-K5 (Density measurements by oscillation-type density meters)**

  Pilot: BEV, 17 participants, Measurement completed

- **CCM.D-K6 (Refractive index of liquid)**

  Pilot: NMIJ, 10 NMI and DI are interested, Questionnaire in progress

KCs completed and underway (Viscosity)

KCs completed

- **CCM.V-K1 (2000 -2002)**

Wide viscosity range (10 mm2/s to 40000 mm2/s) for 3 liquids, Pilot : PTB, 18 participants

- **CCM.V-K2 (2006-2009)**

Wide temperature range (- 40 ˚C to 100 ˚C) for 2 liquids, Pilot: Cannon, 14 participants

- **CCM.V-K3 (2012-18)**

Wide viscosity range (5 mm2/s to 160000 mm2/s) for 3 liquids, Pilot: NMIJ, 19 participants

KCs underway

- **CCM.V-K4 (2018 -)**

  Wide temperature range (10 ˚C to 100 ˚C) for 2 liquids,
  Pilot: CENAM, 12 participants, Draft B in progress

KCs planned

- **CCM.V-K5 Viscosity of standard liquids (2024-)**

  Wide viscosity range (5 mm^2/s to 160000 mm^2/s) with three liquids,

  Pilot: NIM, about 15-16 NMIs and DI are interested in participation

Program of work for the next 2 years

- **Start KCs underway on density**
  CCM.D-K3 and CCM.D-K6
- **Proceed and complete KCs underway on density**
  CCM.D-K1.2023, CCM.D-K5
- **Initiate planning KCs planned on density**
  CCM.D-K2.202X and CCM.D-K4.202X
- **Start KC planned on viscosity**
  CCM.V-K5
- **Initiate planning pilot study of surface tension**
- **Proceed discussions for reviewing CMCs and service category**

Proposed changes (membership, chairmanship, ToRs)

- **Membership of WGDV**

  Nomination of SE "Ukrmetrteststandart““ as a member of WGDV

  (Ukrainian Designated Institute for liquid density and viscosity measurements)

Thank you.

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