

# **NATIONAL METROLOGY INSTITUTE OF SOUTH AFRICA (NMISA)**

## **Activity Report in Electricity and Magnetism**

*Prepared for the 32<sup>nd</sup> meeting of the CCEM, 14-15 April 2021*

### **DCLF & RF laboratories**

#### **AC Power** (Contact: [fprinsloo@nmisa.org](mailto:fprinsloo@nmisa.org))

The laboratory commissioned its primary AC power measurement system, which is based on the digital simultaneous sampling technique and includes down-conversion of the generated voltage using RVD and current measurement across precision AC shunt. The system employs an embedded method for reference phase angle calibration and is operated by an in-house developed software. The laboratory participated in the CCEM-K5.2017 key comparison of 50/60 Hz power.

The laboratory developed a method and commissioned a system for calibration of the output of the power harmonics sources. The method addresses measurement of the rms level and individual harmonic magnitudes in a voltage or current waveform that is traceable to the reference standards in AC-DC transfer difference, DC voltage and resistance. In the tests of waveforms including power frequency harmonic components up to the 50th order, attained measurement uncertainty of the validated system is 160  $\mu\text{V/V}$  for combined rms voltages up to 90 V, and 270  $\mu\text{A/A}$  for combined rms currents up to 7 A. Using the specially designed automation hardware components, measurement process control is fully automated for the given test waveform setting and is operated using the in-house developed software.

#### **DC Resistance** (Contact: [mkhoza@nmisa.org](mailto:mkhoza@nmisa.org))

As part of the organisation's recapitalization program, the DC laboratory commissioned a new DC resistance measurement system with a 5 kV range extender to enable outputs up to 5 kV which are useful for the calibration of high voltage standard resistors. The system allows for automated high resistance measurements (100 k $\Omega$  to 10 P $\Omega$ )

#### **Radio Frequency** (Contact: [lmagagula@nmisa.org](mailto:lmagagula@nmisa.org))

Participated in a primary level power measurement EURAMET project of Comparison on Effective Efficiency Measurement of Thermistor Mount in Coaxial Line up to 18 GHz piloted by TUBITAK UME to check our relatively newly commissioned Coaxial Dual Line Calorimeter.