

Uncertainty Evaluation of Josephson Voltage Standard in the Level of 10^{-10}

K. T. Kim*, M. S. Kim, Y. Chong, W. S. Kim, W. Song
Korea Research Institute of Standards and Science, Daejeon, Korea

For almost two decades, the KRISS Josephson voltage standard has been quietly but continuously serving as the national primary standard which provides nation-wide electrical calibrations with traceability to the SI (the International System of Units). Beginning from an mV single Josephson junction system, the KRISS Josephson voltage standard has been renovated to the 1 V array system, and currently to the 10 V array systems. The most recent improvement in the 10 V array system included optically-isolated GPIB acquisition, ultra high insulation noise filter, and minimizing thermal drift in probe wires by reduction of polarity reverse time and others. We have re-evaluated the uncertainty of the 10 V Josephson array systems after the improvement. The uncertainty evaluation of 10 V standard included a comparison with a programmable Josephson array system at 1 V. Every contribution to the measurement uncertainty was evaluated in the level of 10^{-10} . The estimated combined uncertainty was found to be approximately 10^{-9} at 10 V, which was limited only by the indirect verifying method. In the near future, direct comparison at 10 V will provide more accurate uncertainty for the KRISS Josephson voltage standard.

Keywords: Josephson voltage standard, uncertainty, comparison, josephson junction array, SI