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## Linearity measurement of digitizers used in sampling-based digital impedance bridges by the method of permuting capacitors

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### Abstract

Experimental studies of commercial PXI digitizers in terms of their use in primary impedance metrology are presented in the paper. The scope of the work includes the presentation of the permutation method and presentation of new physical model of permuting capacitor device developed at Silesian University of Technology (SUT). The spread of the parameters of the capacitors used proves that the developed device can be used as a reference standard for measuring the voltage ratio. The developed permuting device was used by the authors to measure nonlinearity errors of digitizers on boards NI PXI-4462 which is commonly used in National Metrology Institutes for impedance measurement purposes. The obtained results showed the nonlinearity errors at the level  $10^{-6}$  and proved possibility of comparing standards with modulus ratios of 5:1 with an uncertainty of  $5 \cdot 10^{-6}$  without the need to correct digitizer nonlinearity. Moreover, the results allowed the authors to select a digitizer with the lowest nonlinearity errors that is used in digital sampling impedance bridge being currently developed at SUT.

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