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Research note

Increasing signal-to-noise ratio and retrieving signal in $SNR \ll 1$ by using lock-in amplifier simulation in the LabVIEW software environment

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Abstract

The detection of weak signals is one of the important issues in spectroscopy. The most important parameter of this field is the signal to noise ratio, which has a significant effect on the accuracy of the final data. In this regard, one of the most successful methods to increase the signal-to-noise ratio is applying the intensity modulation method. In this method, first, the intensity of the initial signal is modulated; after entering the spectrometer, it is demodulated and amplified by a lock-in amplifier. Eventually, the desired signal is recovered from various noises. The simulation allows the user to examine and optimize the related parameters for different initial conditions. The present article is dedicated to designing a lock-in amplifier by applying a LabVIEW graphical programming language.

Keywords: spin-optoelectronic, transition metal dichalcogenide nanoribbons, quantum efficiency, full spin polarization

For full article, please refer to the Persian section