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Problems of terahertz images quality enhancement.

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Along with the progress in the field of terahertz imaging equipment, there is growing interest in the processing of the obtained terahertz images. In the recent years the scope of such processing has been significantly extended and now includes the stage of their visual quality enhancement [1] before applying any information extraction procedures (e.g. object or edge detection) or being visually inspected by an expert. Such processing allows to deal with some problems that are difficult to solve at the technical level, while increasing the information value of the data obtained. However, since terahertz images have a number of peculiarities, applying to them approaches that have become standard in the field of digital image processing often turns out to be difficult. In addition, terahertz images may contain non-trivial types of distortions for which there are no ready-made solutions yet.

Since the analysis and processing of terahertz images is a relatively new field, there is very little information about the distortions that can be present in terahertz images, as well as ways to eliminate them. Therefore, the analysis of real data and generalization of the obtained results are critical for the development of this area. Using examples of real data analysis, the work examines the main types of distortions that may be present in terahertz images. It is shown that terahertz images usually contain noise, which can vary greatly in type and intensity depending on the object under study, image acquisition method and the equipment settings. Also, there is always extensive blur caused by combined factors, which makes it very difficult to model [2]. In addition, images often contain gradient or chaotic changes in brightness, which are the result of interference and do not correspond to the nature of the object being studied.

Some types of distortions (in particular, noise [1] and some types of gradients) may be eliminated successfully and the work describes the methods that can be used for this purpose. The results of processing of terahertz images are presented, as well as numerical criteria confirming its effectiveness. The possible directions for future research are given.

REFERENCES

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