4.5.32. APPLICATION OF DUAL-ENERGY DIGITAL RADIOGRAPHY FOR PORTABLE X-RAY TELEVISION SYSTEMS

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Complex «NORKA» is intended to carry out experiments with dual-energy digital radiography. Main parts of the complex are: X-ray apparatus with programmable selection of energies and X-ray television system possessing with linear dose sensitivity. Possibility of this system application for determination of test objects pertinence to «metal" – "non-metal" classes with indication of relative thickness is demonstrated. Dual-energy digital radiography method is applied widely in inspections systems [1]. Its main advantage before the single-energy method consists in ability to distinguish substances under their atomic number *Z*.

Classification is achieved by means of comparison of absorbance with two energies. Attenuation coefficients of organic (with small Z) and nonorganic (with large Z) substances have different behavior.

Until recently, dual-energy radiography method was applied only in scanning systems. Photography is performed at just the same voltage of X-ray apparatus into two different detectors. One of them receives signal on soft radiation, while second one, which is located usually behind the absorber – on hard radiation.

In portable X-ray television systems, there is only one detector. Therefore, in order to implement dual-energy radiography, it is necessary to vary energy radiation spectrum, which can be achieved either by photography at two different voltages or by introduction of an absorber. First option is featured by high luminosity, since no absorbers are used in this case.

Purpose of this work is to study possibility to implement the dual-energy digital radiography method for portable X-ray television system by means of a photography at two different voltages.

Herewith, both overlapping and not overlapping objects are classified, as a rule, correctly. However, at edges of metal objects, classification occurs incorrectly due to the presence of scattering being characteristic for noncollimated systems.

Proposed system can be used for detection of potentially hazardous substances like explosives and drugs.