

γ -ray Imaging by Using Shadow Hologram and its Tomographic Effect

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Shadow holography has been studied as one of the methods of γ -ray imaging. This method consists of the processes to obtain holograms by means of recording the shadow on X-ray film and to reconstruct images using the laser optical system. In order to obtain shadow holograms of γ -ray sources the positive or the negative zone plate is generally used in place of collimator. However image quality of these reconstructed images is not satisfied sufficiently for a larger size of γ -ray source, because of undiffractive component (DC component) of laser beam through a hologram. In this report the method of decreasing undiffractive component is discussed for the purpose of improving reconstructed images. (Experiment) Shadow hologram obtained with on-axis Fresnel zone plate shows the harmonic analyzed pattern of γ -ray source, so the lower frequency components are recorded at the neighborhood of center and higher components at

further out of center. Therefore the hologram of object with lower frequency components is formed as the pattern having many informations at the neighborhood of center. For avoiding to lose the informations of lower components, we tried to use γ -ray filter (Copper plate) on the on-axis positive zone plate by which saturation of film density was avoided and hologram pattern of lower components became more clear. The relation between film density of holograms and image quality of reconstructed images was discussed. (Result and discussion) Using γ -ray filter, DC component by the first open zone was decreased and lower components were enhanced. This method using γ -ray filter and positive zone plate could improve image quality of reconstructed images for the objects with lower components. Also tomographic effect was studied by this method and good results could be obtained.

A New Collimator of Ring Time Modulated Multipule-Pinhole Coded Aperture

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A method of obtaining tomographic image from a single exposure to the gamma ray emitted by an object is multiple-pinhole coded aperture imaging. One of problems is effectively of eliminating noise image out of focus in a final decoded image in

focus. A new collimator of ring time modulated multipule-pinhole coded aperture was developed, the aperture of 12 of 24 holes were symmetrically arranged in a ring and rotated by a motor drive (2 rot./sec) at 6 cm radius from the center of the