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### *Abstract*

The technique of holography has been using holography film plates as recording media and optical reconstruction to obtain three-dimensional image of an object. Using plate film, as recording media and optical holography reconstruction, is relatively expensive and needs more time. This study built a digital image processing program to replace the optical reconstruction process that uses holography film plates. The program does the calculating process from recording images of the real image of holography (as fringe) with a numerical calculation method and the artificial life method. This calculation produces a real image which is the object was used during recording. Each of recording holography, uses a different method of reconstruction that is inline or offline, because the digital reconstruction is influenced by the recording method that was used (recording setup). This research can be known that the reconstruction using the artificial life method is better than the reconstruction method with numerical calculations, because the visual of reconstructed image that obtained by the artificial life method is same with the original object. It is caused by the sample that was used for comparison was reconstructed inlinely. It is appropriates with approachment that taken by artificial life, that is an inline approach. In this study, the results of holography reconstruction with artificial life is still not good enough because the resolution that was used is too small that is 200x200 pixels, compared with the resolution that used for the reconstruction of holography in general is 1024x1024 pixels. Numerical reconstruction method which built in this research has not produced a maximum output of image reconstruction. Further research is needed to improve numerical reconstruction methods of digital holography by looking at the theoretical formulation which used in the numerical reconstruction of holography.

Keywords: reconstruction of holograms, digital reconstruction holography, filters, image quality, resolution, and artificial life.