

MEASUREMENT ACCURACY OF CENTER LOCATION OF A CIRCLE BY CENTROID METHOD

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ABSTRACT:

This paper reports an investigation of the effect of digitization on the measurement accuracy of the center location of a circle by a centroid method. Although general expressions representing the measurement accuracy of the center location of a circle by the centroid method are unable to be obtained analytically, we have succeeded in obtaining the variances V of measurement errors for 39 quantization bits n ranging from one to infinity by numerical integration. We have succeeded in obtaining the effective approximation formulae of V as a function of the diameter d of the circle for any n as well. The results show that V would oscillate on an approximate one-pixel cycle in d for any n and decrease as n increases. The differences of V among the different n would be negligible when $n \geq 6$. Some behaviors of V with an increase in n are demonstrated.

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