

# CIRCULANT MATRICES OF DEGREE $l^2$

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**Abstract:** Circulant matrices have quite wide range of application in many different branches of mathematics, such as data and time-series analysis, signal processing or Fourier transformation. Huge number of results concerning circulant matrices could be found in algebraic number theory, this is because from the ring of circulant matrices of prime degree  $p$  one could construct factor ring isomorphic to the  $p$ -th cyclotomic field  $(\zeta_p)$ . In this paper connection between ring of circulant matrices of degree  $l^2$ , ie.  $C_{l^2}$ , with  $l$  equal to odd prime, and the  $l^2$ -th cyclotomic field is discussed/shown.

**Keywords:** circulant matrix, cyclotomic field