

SOME BOUNDS FOR CENTRAL MOMENTS AND SPREADS OF MATRICES

RAVINDER KUMAR*, VIDHI BHATIA AND HARIKRIPAL

Abstract. In this paper, we obtain some inequalities for the central moments of discrete and continuous distributions, which, in turn, gives some lower bounds for the spread of a matrix when all of its eigenvalues are real. Likewise, we obtain lower bounds for the span of a polynomial equation.

Mathematics subject classification (2020): 12D10, 15A42, 60E15.

Keywords and phrases: Central moments, trace, positive linear functionals, eigenvalues, span, polynomial.

REFERENCES

- [1] L. ARAMBASIC, D. BAKIC AND M. S. MOSLEHIAN, *A treatment of the Cauchy-Schwarz inequality in C^* -modules*, J. Math. Anal. Appl., **381**, (2011), 546–556.
- [2] R. BHATIA AND C. DAVIS, *A better bound on the variance*, Amer. Math. Monthly, **107**, (2000), 353–357.
- [3] R. BHATIA, *Positive Definite Matrices*, Princeton University Press, USA, 2007.
- [4] R. BHATIA AND R. SHARMA, *Some inequalities for positive linear maps*, Linear Algebra Appl., **436**, (2012), 1562–1571.
- [5] R. BHATIA AND R. SHARMA, *Positive linear maps and spreads of matrices*, Amer. Math. Monthly, **121**, (2014), 619–624.
- [6] C. R. JOHNSON, R. KUMAR AND H. WOLKOWICZ, *Lower bounds for the spread of a matrix*, Linear Algebra Appl., **29**, (1985), 161–173.
- [7] Z. LEKA, *Some inequalities for central moments of matrices*, Linear Algebra Appl., **496**, (2016), 246–261.
- [8] J. K. MERIKOSKI AND R. KUMAR, *Characterization and lower bounds for the spread of a normal matrix*, Linear Algebra Appl., **364**, (2003), 13–31.
- [9] L. MIRSKY, *The spread of a matrix*, Mathematika, **3**, (1956), 127–130.
- [10] K. PEARSON, *Mathematical contribution to the theory of evolution XIX; second supplement to a memoir on skew variation*, Philos. Trans. Roy. Soc. London, Ser. A **216**, (1916), 429–457.
- [11] T. POPOVICIU, *Sur les équations algébriques ayant toutes leurs racines réelles*, Mathematica, **9**, (1935), 129–145.
- [12] R. M. ROBINSON, *On the span of derivatives of polynomials*, Amer. Math. Monthly, **67**, (1964), 504–508.
- [13] R. SHARMA AND R. KUMAR, *Remark on upper bound for the spread of a matrix*, Linear Algebra Appl., **438**, (2013), 4459–4362.
- [14] R. SHARMA, R. KUMAR, R. SAINI AND G. KAPOOR, *Bounds on spreads of matrices related to fourth central moment*, Bull. Malays. Math. Sci. Soc., **41**, (2018), 175–190.
- [15] R. SHARMA, R. KUMAR, R. SAINI AND P. DEVI, *Inequalities for central moments and spreads of matrices*, Ann. Func. Anal., **11**, (2020), 815–830.