

Citations From References: 13 From Reviews: 0

MR2735731 (2011j:60017) 60B20 Chafaï, Djalil (F-MARN-AMA)

Circular law for noncentral random matrices. (English summary)

J. Theoret. Probab. 23 (2010), no. 4, 945–950.

In this paper, the author considers random matrices of the form X+M, where X is the  $n\times n$  upper-left corner of an infinite array of i.i.d. random variables with mean zero and variance one, and M is a deterministic matrix such that  $\mathrm{Tr}(MM^*)=O(n^2)$  and  $\mathrm{rank}(M)=O(n^\alpha)$  for a certain  $\alpha<1$ . He proves that, just as if M had not been added to X, the empirical spectral law of  $(X+M)/\sqrt{n}$  converges almost surely to the uniform law on the unit disc of the complex plane. Florent Benaych-Georges

## References

- 1. Andrew, A.L.: Eigenvalues and singular values of certain random matrices. J. Comput. Appl. Math. **30**(2), 165–171 (1990) MR1062321
- 2. Bai, Z.D.: Circular law. Ann. Probab. **25**(1), 494–529 (1997) MR1428519
- 3. Bai, Z.D.: Methodologies in spectral analysis of large-dimensional random matrices, a review. Stat. Sin. 9(3), 611–677 (1999). With comments by G.J. Rodgers and J.W. Silverstein; and a rejoinder by the author MR1711663
- Bai, Z.D., Silverstein, J.W.: Spectral Analysis of Large Dimensional Random Matrices. Mathematics Monograph Series, vol. 2. Science Press, Beijing (2006) MR2567175
- 5. Bai, Z.D., Yin, Y.Q.: Limit of the smallest eigenvalue of a large-dimensional sample covariance matrix. Ann. Probab. **21**(3), 1275–1294 (1993) MR1235416
- Benaych-Georges, F., Rao, R.N.: The eigenvalues and eigenvectors of finite, low rank perturbations of large random matrices. Preprint, 0910.2120 (2009) MR2782201
- 7. Chafaï, D.: Aspects of large random Markov kernels. Stochastics **81**(3–4), 415–129 (2009). MR MR2549497 MR2549497
- Chafaï, D.: The Dirichlet Markov ensemble. J. Multivar. Anal. 101, 555–567 (2010) MR2575404
- 9. Edelman, A.: The probability that a random real Gaussian matrix has k real eigenvalues, related distributions, and the circular law. J. Multivar. Anal. 60(2), 203-232 (1997) MR1437734
- Girko, V.L.: The circular law. Teor. Veroyatn. Primen. 29(4), 669–679 (1984) MR0773436
- 11. Götze, F., Tikhomirov, A.: The circular law for random matrices. Ann. Probab. (2010, to appear). arXiv:0709.3995 [math.PR] MR2663633
- 12. Hwang, C.-R.: A brief survey on the spectral radius and the spectral distribution of large random matrices with i.i.d. entries. In: Random Matrices and Their Applications, Brunswick, Maine, 1984. Contemp. Math., vol. 50, pp. 145–152. Am. Math. Soc., Providence (1986). MR MR841088 (87m:60080) MR0841088
- Mehta, M.L.: Random Matrices and the Statistical Theory of Energy Levels. Academic Press, New York (1967) MR0220494
- 14. Pan, G., Zhou, W.: Circular law, extreme singular values and potential theory. J. Multivar. Anal. 101, 645–656 (2010) MR2575411
- 15. Rudelson, M., Vershynin, R.: The Littlewood-Offord problem and invertibility of

- random matrices. Adv. Math. 218(2), 600–633 (2008). MR MR2407948 MR2407948
- 16. Silverstein, J.W.: The spectral radii and norms of large-dimensional non-central random matrices. Commun. Stat. Stoch. Models **10**(3), 525–532 (1994) MR1284550
- 17. Śniady, P.: Random regularization of Brown spectral measure. J. Funct. Anal. 193(2), 291–313 (2002) MR1929504
- 18. Tao, T., Vu, V.: Random matrices: the circular law. Commun. Contemp. Math. **10**(2), 261–307 (2008). MR MR2409368 (2009d:60091) MR2409368
- 19. Tao, T., Vu, V.: Random matrices: Universality of ESDs and the circular law. Ann. Probab. (2010, to appear). arXiv:0807.4898 [math.PR] MR2722794
- 20. Thompson, R.C.: The behavior of eigenvalues and singular values under perturbations of restricted rank. Linear Algebra Appl. 13(1/2), 69–78 (1976). Collection of articles dedicated to Olga Taussky Todd MR0407051

Note: This list reflects references listed in the original paper as accurately as possible with no attempt to correct errors.

© Copyright American Mathematical Society 2021