PROBABILITY
AND
MATHEMATICAL STATISTICS
Vol. 36, Fasc. 1 (2016), pp. 137–145

A CONSTANT REGRESSION CHARACTERIZATION OF THE MARCHENKO–PASTUR LAW

Kamil Szpojankowski

Abstract: In this paper, Lukacs type characterization of Marchenko–Pastur distribution in free probability is studied. We prove that for free $\mathbb{X}$ and $\mathbb{Y}$, if conditional moments of order 1 and -1 of $(\mathbb{X}+\mathbb{Y})^{-1/2}\mathbb{X}(\mathbb{X}+\mathbb{Y})^{-1/2}$ given $\mathbb{X}+\mathbb{Y}$ are constant, then $\mathbb{X}$ and $\mathbb{Y}$ follow the Marchenko–Pastur distribution.

2000 AMS Mathematics Subject Classification: Primary: 46L54; Secondary: 62E10.

Keywords and phrases: Lukacs characterization, free Poisson distribution, free cumulants.