• **Abstract.** The paper proposes the corrected likelihood ratio test (LRT) and large dimensional trace criterion to test the independence of two large sets of multivariate variables when the dimension p and the sample size n tend to infinity simultaneously. Both theoretical and simulation results demonstrate that the traditional χ^2 approximation of the LRT perform poorly when the dimension p is large relative to the sample size n, and the corrected LRT and large dimensional trace criterion behave well when the dimension is either small or large relatively to the sample size. Moreover, the trace criterion can be used in the case of $p_2 > n - p_1$, while the corrected LRT is unfeasible due to $p_2/(n-1-p_1) \to r_2(\text{a constant}) \geq 1$, where p_1 and p_2 are the dimensions of the subvectors $\mathbf{X}_i, i = 1, 2$ from the partition of $\mathbf{X}$,respectively.

Keywords: large-dimensional data analysis; independence test; random F-matrices