# On a two-sample test for equality of matrix distributions based on Laplace transforms

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**Abstract.** Recent results concerning statistical testing in the cone of symmetric positive definite matrix distributions have mainly been focused on orthogonally invariant distributions. A goodness-of-fit test for the Wishart distribution was presented in [1], while a two-sample test for equality of orthogonally invariant distributions was studied in [2].

In this talk, our attention will be on a novel two-sample test for equality of positive definite matrix distributions, which may not necessarily be orthogonally invariant. This test is constructed as the integral of the squared difference of the empirical Laplace transforms with respect to the noncentral Wishart measure.

Additionally, we will present a power study conducted using the warp speed bootstrap method. Furthermore, we will demonstrate the applicability of the test through two real data examples. Finally, we will discuss potential generalisations of this approach.

**Keywords:** noncentral Wishart measure; Laplace transform; equality of distributions; application in finance.

## References

[1] **E. Hadjicosta, D. Richards.** Integral transform methods in goodness-of-fit testing, II: the Wishart distributions. *Annals of the Institute of Statistical Mathematics*, 2020, 72, 1317–1370.

[2] **Ž. Lukić, B. Milošević.** A novel two-sample test within the space of symmetric positive definite matrix distributions and its application in finance. *Annals of the Institute of Statistical Mathematics*, accepted for publication.