

We consider the problem of comparing two complex multivariate random signal realizations to ascertain whether they have identical power spectral densities. Past work on this problem is limited to either scalar signals or real-valued multivariate signals. A binary hypothesis testing approach is formulated and a generalized likelihood ratio test (GLRT) is derived. An asymptotic analytical solution for calculating the test threshold is provided. We analyze the performance of this GLRT by deriving an approximate asymptotic distribution of the test statistic under the alternative hypothesis. We also provide robustification of this approach by adding artificial white noise to the received noisy signals. The results are illustrated via computer simulations which include application to user authentication in wireless networks with multiantenna receivers.