Exact spectral densities of non-Hermitian noise-plus-structure random matrices

Jacek Grela, Thomas Guhr

Jagiellonian University, Krakow, University of Duisburg-Essen, Duisburg

jacekgrela@gmail.com, thomas.guhr@uni-due.de

We use supersymmetry to calculate exact spectral densities for a class of non-Hermitian complex random matrix models having the form $M = S + LXR$, where $X$ is a random noise part $X$ and $S, L, R$ are fixed structure parts. This is a certain version of the ”external field” random matrix models. We found two-fold integral formulas for arbitrary structural matrices. We investigate some special cases in detail and carry out numerical simulations. The presence or absence of a normality condition on $S$ leads to a qualitatively different behaviour of the eigenvalue densities.