Piorkowski, Mateusz
Riemann-Hilbert theory without local parametrix problems: applications to orthogonal polynomials. (English) Zbl 07389235

Summary: We study whether in the setting of the Deift-Zhou nonlinear steepest descent method one can avoid solving local parametrix problems, while still obtaining asymptotic results. We show that this can be done, provided an a priori estimate for the exact solution of the Riemann-Hilbert problem is known. This enables us to derive asymptotic results for orthogonal polynomials on $[-1,1]$ with a new class of weight functions. In these cases, the weight functions are too badly behaved to allow a reformulation of the local parametrix problem to a global one with constant jump matrices. Possible implications for edge universality in random matrix theory are also discussed.

MSC:
35Qxx Partial differential equations of mathematical physics and other areas of application
15Bxx Special matrices
42Cxx Nontrigonometric harmonic analysis

Keywords:
Riemann-Hilbert theory; orthogonal polynomials; random matrices

Full Text: DOI

References:


Egorova, I.; Pikovskii, M.; Teschl, G., On vector and matrix Riemann-Hilbert problems for KdV shock waves


