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## Geometry of Products of Random Matrices

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A general and basic problem of random matrix theory is the determination of the distribution of eigenvalues of products or sums of matrices chosen randomly from specific classes of matrices. The coarsest invariant is the support of the distribution. In the case of conjugacy classes from compact classical groups this problem is resolved by reformulating it as a problem about semi-stable vector bundles on marked Riemann surfaces. The solution is essentially a result of Mehta and Seshadri (in the algebraic framework) or Donaldson and Biquard (in the differential geometric framework). Finer invariants of the distribution of eigenvalues leads to complex geometric/combinatorial problems (Knutson-Tao) which are not yet clearly understood. This lecture is a survey of the state of the art on this subject.