1059-65-3 **Ioana Dumitriu*** (dumitriu@math.washington.edu), University of Washington, Department of Mathematics, BOX 354350, Seattle, WA 98195. *Random matrix theory, numerical linear algebra, and scientific computing: border interactions.*

The connection between numerical linear algebra and random matrix theory is simple but deep: the latter solves stochastically one of the most important problems of the former—computing eigenvalues (singular values) and eigenvectors (singular vectors). Naturally, methods from (numerical) linear algebra have been applied successfully to the study of large random matrices, and random matrices have been used as "average case" tests for algorithms known in practice to vastly outperform their worst-case theoretical bounds.

The connections between these fields, however, are even deeper, and lead in one direction to the discovery and study of new matrix models for well-known (theoretical) eigenvalue ensembles. In the other direction, these connections lead to applications in scientific computing, involving the use of randomization and random matrix theory to obtain faster and more reliable algorithms for eigenvalue/singular value computations. As a bonus, these algorithms prove to also be, communication-wise, within a constant factor of optimal.

We will survey some of the new results in the area and examine further opportunities for research using such "border interactions" between these fields of mathematics and computational science. (Received February 23, 2010)