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Freeness and the Transpose

One of the most stunning achievements of free probability theory is that freeness can be used to model certain ensembles of random matrices. These theorems, which go back to Voiculescu in 1991, assume that the ensembles are independent and satisfy some invariance condition and conclude that the ensembles are asymptotically free, in that as the size of the matrix increases the matrices become free in the sense of Voiculescu.

Recently Mihai Popa and I showed that a matrix can be free from its transpose or even its partial transpose, thereby eliminating the independence assumption. I will give a brief explanation of asymptotic freeness and illustrate this with some simple examples.