Matrix convertibility over finite field

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Matrix A of order n is convertible if it is possible to multiply some of its elements by minus ones in such a way that for the obtained matrix A' the permanent of A is equal to the determinant of A'. The notion of convertibility was defined by Pólya as an alternative way to compute permanent function. Convertibility is well studied only for the set of (0,1)-matrices.

Another way to compute permanent function of integer-valued matrix is to compute $\mathrm{per}(A)(\mathrm{mod}\ k)$ for different integer k and apply Chinese remainder theorem for obtained values. If k is a prime number then computing $\mathrm{per}(A)(\mathrm{mod}\ k)$ is equivalent to computing of the permanent function over finite field with k elements. This is the reason to study the convertibility for matrices over finite fields.

In the talk some properties of convertibility for matrices over finite fields will be discussed. Among the properties under discussion there are some results for (0,1)-matrices in the case of finite fields and sufficient condition of convertibility over finite field.