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Coprime polynomial pairs, Hankel matrices, and splitting subspaces

We give a combinatorial proof of the fact that the probability for two randomly chosen monic polynomials in $\mathbb{F}_q[X]$ of degree n to be coprime is identical with the probability for an $n \times n$ Hankel matrix over $\mathbb{F}_q$ to be nonsingular. We will also discuss an open problem of determining the number of the so called splitting subspaces of a given dimension over a finite field, and outline some recent progress.