The perfect matching versus edge incidence matrix of a graph

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Let G be a graph having $m > 0$ perfect matchings and n edges. The perfect matching versus edge incidence matrix of G is the $m \times n$ matrix $B = [b_{M,e}]$ whose rows are indexed are indexed by the perfect matchings of G, whose columns by the edges of G, and whose (M, e)-entry if 1 if e is an edge of the perfect matching M and is 0 otherwise. We study the linear algebraic properties of G over various fields. In particular we focus on the case that G is a complete graph and the field has characteristic 2. In this case we relate the problem to determinants of Seidel matrices of tournaments and skew-conference matrices.

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