Weakly self-orthogonal designs and related linear codes

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A 1-design is weakly self-orthogonal if all the block intersection numbers have the same parity. If both k and the block intersection numbers are even then 1-design is called self-orthogonal and its incidence matrix generates a self-orthogonal code. We analyze extensions, of the incidence matrix and an orbit matrix of a weakly self-orthogonal 1-design, that generates a self-orthogonal code over the finite field. Additionally, we develop methods for constructing LCD codes by extending the incidence matrix and an orbit matrix of a weakly self-orthogonal 1-design.