A BRUCK-RYSER TYPE NONEXISTENCE THEOREM

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Communicated by Irving Reiner, March 21, 1968

Let P be a regular, bipartite graph of degree $s+1$ on $2(2+s+s^2)$ nodes with girth 6. Equivalently, let P be a $v\times v$ $(3, s, s)$-configuration with $v=2+s+s^2$. Then it is known that either $s+1$ or $s-1$ is a perfect square (see [2] and [3] for related definitions and results). Using techniques suggested by [1] we prove the following:

THEOREM. *Let* $s\equiv 1 \pmod 8$ *and let* $p\equiv 3 \pmod 8$ *be a prime dividing the square-free part of* $s+1$. *Then no* P *can exist. Also, if* $s\equiv 3 \pmod 8$ *and* $p\equiv 7 \pmod 8$ *is a prime dividing the square-free part of* $s-1$, *then no* P *can exist.*

The second statement of the theorem may also be proved by a direct application of the Bruck-Ryser theorem to a (v, k, λ)-design with $\lambda=2$ which may be obtained by "halving" P. Proofs of these and other related results will be given elsewhere.

REFERENCES

1. J. K. Goldhaber, *A note concerning subspaces invariant under an incidence matrix*, J. Algebra **7** (1967), 389–393.

2. S. E. Payne, *On the nonexistence of a class of configurations which are nearly generalized n-gons* (to appear).

3. S. E. Payne and M. F. Tinsley, *On* $v_1\times v_2$ (n, s, t)*-configurations*, J. Combinatorial Theory (to appear).

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