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Cycle extensions in BIBD block-intersection graphs. (English) Zbl 1269.05064

Summary: A cycle $C$ in a graph $G$ is extendable if there is some other cycle in $G$ that contains each vertex of $C$ plus one additional vertex. A graph is cycle extendable if every non-Hamilton cycle in the graph is extendable. A balanced incomplete block design, BIBD($v, k, \lambda$), consists of a set $V$ of $v$ elements and a block set $B$ of $k$-subsets of $V$ such that each 2-subset of $V$ occurs in exactly $\lambda$ of the blocks of $B$. The block-intersection graph of a design $D = (V, B)$ is the graph $G_D$ having $B$ as its vertex set and such that two vertices of $G_D$ are adjacent if and only if their corresponding blocks have nonempty intersection. In this paper, we prove that the block-intersection graph of any BIBD($v, k, \lambda$) is cycle extendable. Furthermore, we present a polynomial time algorithm for constructing cycles of all possible lengths in a block-intersection graph.

MSC:
05C38 Paths and cycles
05B05 Combinatorial aspects of block designs

Keywords:
cycle extension; block design; intersection graph; polynomial time algorithm

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References:

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