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Subgraphs in which each pair of edges lies in a short common cycle. (In English)

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$G^k(n,l)$ denotes a k-graph having n vertices and l edges. Theorem 1. For each positive constant c and sufficiently large n there exists a positive constant c' such that each $G^k(n,cn^k)$ contains $c'n^{2k}$ distinct copies of the complete k-partite k-graph having 2 vertices in each colour class. Corollary 1. For each positive constant c there exists a positive constant c' such that for sufficiently large n each $G^2(n,cn^2)$ contains a subgraph H with $c'n^2$ edges which has the property that each pair of edges of H are contained in a cycle of H of length 4 or 6, and each pair of edges which share a common vertex are in a cycle of length 4. An edge E of a k-graph G^k is a separating edge if there exists a partition of the vertices into k classes such that E meets each class, but that every other edge of G^k meets at most $k-1$ classes. A k-cycle is a k-graph with at least one edge, having no separating edges, and which is minimal with respect to this property. Corollary 2. For each positive constant c there exists a positive constant c' such that for sufficiently large n each $G^k(c,cn^k)$ contains a sub- k-graph H^k with the property that each pair of edges of H^k are contained in a common k-cycle of H^k.

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05C65 Hypergraphs
05C35 Extremal problems (graph theory)
05C38 Paths and cycles

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complete k-partite sub-k-graph; girth; separating edge